THE MARINE REVIEW

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NEW STEAMER NORTHLAND

THE steamer Northland, launched Nov. 19 from the yard of the Harlan & Hollingsworth Corporation, Wilmington, Del., will be a handsome addition to the fine vessels run by the Norfolk & Washington Steamboat Co., between Washington, D. C., and Norfolk, Va. This vessel has been designed and built by the Harlan & Hollingsworth Corporation, under the direct supervision of D. J. Callahan, vice president and general manager of the Norfolk & Washington Steamboat Co., and his superintending engineer. She is 305 ft. over all, 296 ft. perpendiculars, 52 ft. 6 in. beam extreme, 42 ft. beam molded, designed draught without freight or passengers about 12 ft.

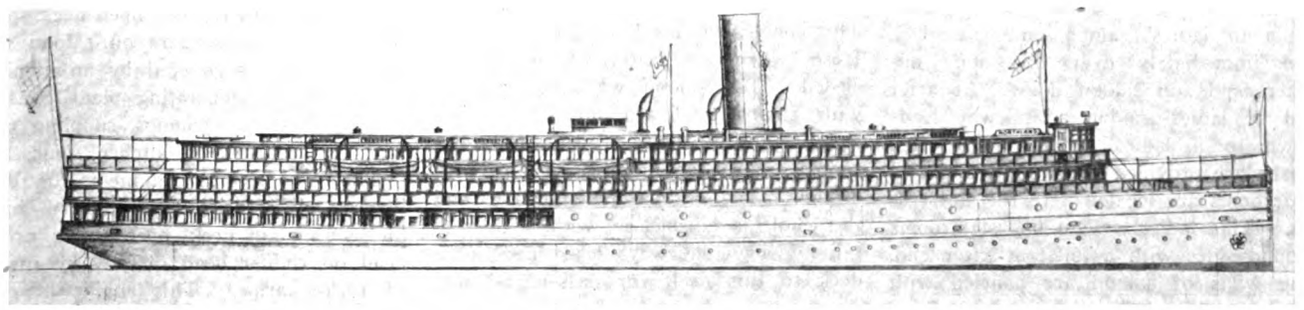
The vessel will be propelled by a four-cylinder, triple-expansion engine, steam being supplied by four Scotch boilers, which machinery will propel her at a speed of about 19 miles per hour.

The vessel has exceptionally fine, clean lines, and the hull is flared out for whole length, which gives additional deck room without recourse to the usual guard braces, necessary with an overhanging guard.

The steel structure, like that of the Southland, is very heavy for a vessel engaged in bay service. The frames and beams are of 6-in. channel steel, spaced 24-in. centers. The shell plating is above rule requirements for a vessel of this size, and is fitted with heavy doublings in vicinity of waterline, and for a considerable length the strake below the sheer strake is doubled. The main and lower decks are plated entirely over with steel, and steel pillars and girders support all decks. Five watertight bulkheads subdivide the vessel transversely into compartments. Web or belt frames are fitted to every frame in machinery space, and on every tenth frame outside of same. Keelsons of channel section combined with the web frame construction and steel pillars and girders make a very stiff and rigid structure.

The enclosure around smoke stacks, engine opening and kitchen uptake are of steel insulated to insure safety from fire, and all upper wood works are supported by steel girders and stiffened by web frames. The principal stairways throughout the vessel are of steel, which with the steel girders and supports will insure same holding position and being accessible until a fire has gained considerable headway.

On the lower deck forward accommodation is provided for petty officers, crew and colored men and women. The partitions of all rooms here are of steel, the beds are of iron pipe with metal springs, metal lockers are provided for



STEAMER NORTHLAND, OF THE NORFOLK & WASHINGTON STEAMBOAT CO.'S FLEET.

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clothing, and steel stairways are provided for access to main deck. This forward compartment is, as far as practicable, rendered fireproof, and no fire could spread if started in this space by carelessness of passengers or crew. The steel deck here is covered with linoleum cemented down.

On lower deck, immediately abaft the engine room, a large kitchen is located, completely fitted out by Duparquet, Huot & Moneuse, with a 16-ft. range, two broilers, dish washing machine, automatic egg boiler, vegetable steamer, steam tables, tea, coffee and hot water urns, etc. Large cold storage room, ice boxes for meat and fish, store rooms, scullery, etc., are provided and conveniently arranged for rapid service.

Description of Dining Room.

The dining saloon is located immediately abaft this kitchen and two large electric fans are provided to draw fresh air through dining room from skylight and stairways, discharging into kitchen uptake vent. The dining room is finished in mahogany, having built-in buffets with mirror backs, silver and china cabinets with moss glass doors. The ceiling is paneled with composite board, finished white with gold relief and mahogany-capped beams and girders supported by steel mahogany encased columns. The tables and chairs are of mahogany and are arranged cafe style. The floor is covered with interlocking rubber tile. The electric fixtures in ceiling and around buffets are designed in harmony with general style of finish.

The stairway from the dining saloon lands in ladies' saloon on main deck and immediately over this stair another lands on saloon deck. At after end of ladies' saloon a stairway leads down to a ladies' cabin, where free berths are provided for women and two staterooms are located here for stewardess. This ladies' saloon has staterooms around sides with a toilet at after end. The walls of saloon are paneled with composite board having pilasters, ornamented frieze, and cast iron grille vent between carlins. The walls are finished ivory white with a white ceiling. Panels, cornice, caps, etc., are relieved with gold, the hardware and electric light fixtures are finished to conform with surroundings.

The entrance hall is located immediately forward of ladies' saloon and is paneled in mahogany from floor to ceiling. The ceiling is finished with large panels of composite board relieved by mahogany encased girders and beams, and supported by columns of a similar character. The entrance doors from outside and to ladies' saloon and bar room, also bulkhead between entrance hall and bar, and ladies' room have large panels of moss glass fitted in small framed sections; the windows are treated in like manner, and all protected by heavy brass railing. The entrance hall is used as a smoking room, the floor is covered with rubber tile and ceiling has ventilating registers fitted. The purser's office and barber shop are each entered from this hall, the floors of each are covered with interlocking tile, and the rooms are fitted with every convenience necessary.

The bar is a large room, finished in fumed oak, old English style, with deep frieze and paneled ceiling; the bar counter and sideboard for glasses, etc., cigar stand, and ice box are all built-in and are of same character and design as panel work of room. The furniture is upholstered in leather and floor is covered with interlocking tile of suitable design.

Forward of bar room on main deck accommodation is provided for chief and assistant engineers, and all space intervening between this and mail, baggage, and toilet rooms forward is used as freight space. The deck here is covered with 1¼-in. oak sheathing on top of the pine deck.

Saloon and Galley Decks.

The saloon deck is given up entirely to passenger accommodation. The staterooms are arranged along each side of a center saloon. Ventilation has been amply provided for by passageways being left between each group of rooms, having at their ends a sliding window. This enables the inside saloon to be kept fresh when all stateroom doors are closed. The saloon walls are paneled with composite board finished Empire style. The ventilating grills to staterooms are of cast iron in keeping with design. The cornice is handsome and the whole is finished in white with gold relief. Two stairways lead from main deck to this deck for passengers' use. Ample saloon and observation room accommodation is provided, handsomely furnished and carpeted. The stateroom floors are of hardwood and rugs are fitted in each. There are eight bedrooms on this deck, fitted with full size brass beds.

The gallery deck has same headroom as saloon deck, and walls are treated in a similar manner. In addition to the usual staterooms, there are eight large bedrooms having four bathrooms, or one between each pair of bedrooms. These bedrooms are all handsomely furnished and finished, the walls and ceilings being paneled in composite board with suitable moldings. The floors are of hardwood with oriental rugs, windows are curtained, the beds are of heavy brass, and the furniture in keeping. The total number of passenger staterooms on the Northland is 157. The bathrooms have floors laid with ceramic tile, having a border and sanitary base with wall tiling to height of wainscot. Above wainscot the bathroom walls are paneled and all finished enamel white. The bath tubs are porcelain enameled and hot and cold fresh or salt water is supplied. Storm grab rods are fitted where required and all fittings in bathroom are nickel plated.

Officers' Quarters.

The pilot house and officers' quarters are located on gallery deck. The pilot house is finished in oak and has floor rubber tiled. The captain's and officers' quarters, located abaft pilot house, are finished in oak and well furnished. A bathroom is provided for the captain, finished similar to those for passengers.

The gallery and all stairways and walls have art metal balustrade surmounted by a mahogany rail subdivided by mahogany stanchions and terminating in mahogany newels or posts. The stairways are all of metal, treads being covered with rubber tile having usual brass trimmings. The dome skylight is carried full length of gallery deck with art glass transom, and has a paneled ceiling well lit by inverted dome fixtures. This vessel will be particularly well lit and ventilated. Drinking fountains or alcoves are located at convenient places for ice water. The furniture through the saloons is of mahogany, upholstered in Spanish leather. The open deck space provided for passengers on saloon and gallery decks is covered by an awning.

The electric generating plant consists of two 35-k. w. dynamos, suppling current for machines in kitchen, fans, and lights. The steering engine is the Williamson differential type, located in a house on main deck, operating a crosshead on rudder head directly by means of rocker arms. This engine is controlled from steering column in pilot house as well as from steering column on saloon deck aft. A hand-screw gear is also supplied and located aft on saloon deck. The windlass is of the Hyde type, fitted with wildcats, stoppers, etc., for cables. Stockless anchors are used and housed in large hawse pipes. Two warping capstans, dock type, made by the American Ship Windlass Co., are located on main deck aft.

Machinery and Auxiliaries.

The vessel will be propelled by a four-crank, triple-expansion engine, having four cylinders, high pressure 23½ in., intermediate 37 in., and two low pressure,

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each 43 in. diameter, the stroke being 42 in. The cylinders are arranged with one low pressure forward, and the other aft, with high and intermediate between, each having one piston valve, which is worked by the Stephenson link motion, with the usual direct connected steam cylinder for reversing.

The crank shaft is 12½ in. diameter, built-up into two pieces and coupled together between the high and intermediate cylinders; the main bearings are of cast steel, five in number. The back columns are of cast iron inverted "Y" pattern, one under each cylinder; the front columns are polished steel, six in number. The turning gear consists of double-cylinder engine, connected by the usual worm and wheels to crank shaft coupling. The condenser is circular, of steel plates, containing about 3,450 sq. ft. surface, placed at back of engine and connected to low-pressure cylinders by copper exhaust pipes. The propeller is a solid four-bladed steel casting, 12 ft. 8 in. diameter.

All pumps are independent of the main engines, several of them being in duplicate, as follows: One vertical twin beam air pump, two vertical duplex feed pumps, one horizontal duplex donkey and fire pump, one horizontal duplex bilge pump, two horizontal duplex salt water pumps, two horizontal duplex fresh water pumps, one horizontal duplex pump for draining steam heating system, one centrifugal circulating pump direct connected to single-cylinder engine for condenser. A feed water heater of the multicoil type is fitted between the feed pumps and boilers.

The boilers are of the cylindrical return tube type, four in number, 12 ft. 6 in. diameter by 11 ft. 3 in. long, allowed a working pressure of 180 lbs. per square inch. Each boiler has three suspension type furnaces, 3 ft. 6 in. diameter, and 265 tubes, 3 in. diameter. The boilers are worked under natural draft, the uptakes being connected to one double stack.

The ashes are handled by means of a hydraulic ash ejector for use at sea, and hand winch in one ventilator for use in port. There are four large ventilators in the fire room and two in the engine room.

ANNUAL MEETING OF SOCIETY OF NAVAL ARCHITECTS AND MARINE ENGINEERS

THE eighteenth annual meeting of the Society of Naval Architects and Marine Engineers was held in the rooms of the society, Engineering Societies building, No. 29 West Thirty-ninth street, New York, on Nov. 17 and 18, and in point of interest and attendance has not been exceeded by any previous meeting. President Stevenson Taylor presided. The report of Secretary-Treasurer W. J. Baxter showed the society to be in good financial condition with total resources of $24,584.80, against which there is a liability of only $600. The membership, however, shows a reduction from 796 to 769, due to the fact that there were 47 suspensions for non-payment of dues, the sum of $2,247.28 being charged off the books thereby.

The members rose while the death roll was read, as follows:

W. T. Powell,
C. R. Roelker,
Horace See,
N. P. Towne,
F. M. Wheeler.

The council elected the following:

(For the term expiring Dec. 31, 1916.)

Vice-presidents:

George W. Quintard, Quintard Iron Works, foot of Twelfth street, New York.

Walter M. McFarland, Babcock & Wilcox Co., 85 Liberty street, New York.

The society by its ballots elected as members of council:

(For the term expiring Dec. 31, 1913.)

W. I. Babcock, naval architect, 17 State street, New York.

W. F. Durand, professor mechanical engineering, Stanford University, Cal.

Nathaniel G. Herreshoff, vice-president and general manager, Herreshoff Mfg. Co., Bristol, R. I.

H. I. Cone, engineer-in-chief, United States navy, Washington, D. C.

J. H. Linnard, naval constructor, United States navy, retired, University club, Philadelphia.

W. A. Post, general manager Newport News S. B. & D. D. Co., Newport News, Va.

Associate Members of Council:

W. H. Brownson, rear admiral, United States navy, retired, 1751 N street, N. W., Washington, D. C.

J. R. Andrews, president, Hyde Windlass Co., Bath, Me.

The council elected as member of council, vice Horace See, deceased:

F. L. DuBosque, assistant engineer floating equipment, Penn. R. R. Co., Jersey City, N. J.

Transfer From Member to Life Member.

Stevenson Taylor, president of society.

Mason S. Chace, naval architect, 31 Wales street, Dorchester, Boston, Mass.

Members:

Joseph S. Blackett, surveyor Lloyd's Register, 17 Battery place, 247 Seventy-ninth street, Brooklyn, N. Y.

Clarence A. Carr, captain, United States navy, inspector of machinery United States navy, Babcock & Wilcox Co., Bayonne, N. J.

Harry C. Crosby, chief hull draftsman, The Moran Bros. Co., Seattle, Wash.

A. M. Dollar, superintendent engineer, Dollar Steamship Co., 160 California street, San Francisco, Cal.

William J. DuBois, general manager, American Mail Steamship Co., 100 Broadway, New York.

Charles B. Calder, general manager Toledo Ship Building Co., Toledo, O.

Howard C. Davis, marine department, Griscom-Spencer Co., 90 West street, N. Y.

John F. McIntosh, chief engineer, Union Oil Co., Mills building, San Francisco, Cal.

Daniel G. McAlpine, marine superintendent, Old Dominion Coal Co., Sydney, N. S.

Dr. Ing. Frederick Gebers, chairman, Imperial Experimental Station, Berlin N. W. 25, Schlenseninsal, Germany.

Arthur W. Berresford, general manager, Cutler Hammer Mfg. Co., Milwaukee, Wis.

Hermann Hullmann, chief constructor, German navy, Berlin W., Reichs-Marine-Stat.

Francis J. S. Nolan, 453 Winslow street, Camden, N. J.

Albert Norris, lieutenant, United States naval academy, Annapolis, Md.

Bernard A. Sinn, 74 Broadway, New York.

Gustav Schmitt, ship and engine surveyor, 25 Whitehall street, New York.

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Dr. Rudolph Veith, engineer-in-chief, German navy, Berlin W.50, Spichernstrabe 23.

Harry W. Warley, superintending engineer, foreign shipping, Standard Oil Co., 26 Broadway, New York.

George J. Robinson, superintendent, J. N. Robins Co., Erie Basin Dry Docks, Brooklyn, N. Y.

Anthony J. McGarvey, superintendent, J. N. Robins Co., Erie Basin Dry Docks, Brooklyn, N. Y.

Albert W. Murray, surveyor, Lloyd's Register of Shipping, 17 Battery place, New York.

Edmund Mills, Marine department, Babcock & Wilcox Co., 85 Liberty street, New York.

William G. Lumsden, mechanical engineer, Electric Boat Co., Quincy, Mass.

Charles H. Bartlett, chief engine draftsman, Electric Boat Co., Quincy, Mass.

Gregory C. Davison, vice-president, Electric Boat Co., 11 Pine street, New York.

Charles H. Bedell, electrical engineer, Electric Boat Co., Quincy, Mass.

Frank T. Cable, superintendent, Electric Boat Co., Quincy, Mass.

Harry C. Farrar, surveyor, Lloyd's Register, 173 Eightieth street, Brooklyn, N. Y.

Henderson B. Gregory, inspecting draftsman, bureau of steam engineering, navy department, Washington, D. C.

Thomas H. White, ship and engine surveyor, 77 Broad street, New York.

George Kotter, superintending engineer, Hamburg-American line, 639 Garden street, Hoboken, N. J.

Frank H. Evers, surveyor, American bureau of shipping, 725 Castro street, San Francisco, Cal.

Henry Black, consulting engineer and ship surveyor, 15 Whitehall street, New York.

William S. Rogers, chief draftsman, The New England Navigation Co., Newport, R. I.

Frank S. Martin, engineer and naval architect, 52 Beaver street, New York.

Associate.

Charles E. Montgomery, assistant to superintending engineer, Panama R. R. S. S. line, 24 State street, New York.

Benjamin B. Pender, general foreman, Balboa Shops and Shipways, Balboa, Panama.

William E. Williams, The Williams & Wells Co., 250 Fulton street, New York.

Benoist d'Azy, lieutenant commander, French navy, naval attache, French embassy, Washington, D. C.

A. Edward Bowers, chief draughtsman, hull department, Staten Island Ship Building Co., Port Richmond, S. I.

Carl A. Carlson, civil engineer, U. S. N., bureau of yards and docks, navy department, Washington, D. C.

A. Clifton Leaveston, chief draughtsman, engineering department, Staten Island Ship Building Co., Port Richmond, S. I.

Joseph S. Shultz, civil engineer, U. S. N., bureau of yards and docks, navy department, Washington, D. C.

Naoji Tomikawa, chief draughtsman, Mitsu Bishi Dockyard & Engine Works, Kobe, Japan.

Associate to Members.

Lew Morton Atkins, assistant naval constructor, United States navy, navy yard, Boston, Mass.

Donald Raymond Battles, assistant naval constructor, United States navy, Fore River Ship Building Co., Quincy, Mass.

Lee Scott Border, assistant naval constructor, United States navy, navy yard, Mare Island, Cal.

Frederic Gallup Coburn, assistant naval constructor, navy yard, Mare Island, Cal.

Waldo Putnam Druley, assistant naval constructor, navy yard, New York, N. Y.

Edwin O. Fitch, Jr., assistant naval constructor, navy department, Washington, D. C.

Paul Henry Fretz, assistant naval constructor, navy yard, Boston, Mass.

Julius A. Furer, assistant naval constructor, navy yard, Charleston, S. C.

Charles Anthony Harrington, assistant naval constructor, navy yard, Portsmouth, N. H.

Sidney Morgan Henry, assistant naval constructor, navy yard, New York.

Herbert Seymour Howard, assistant naval constructor, navy yard, New York.

Parker Henry Kemble, district manager, Edison Electric Illum. Co., 360 Pearl street, Brooklyn, N. Y.

Edwin Graham Kintner, assistant naval constructor, navy yard, Norfolk, Va.

Harry G. Knox, assistant naval constructor, navy yard, Boston, Mass.

Emory Scott Land, assistant naval constructor, navy yard, New York.

Roy Warren Ryden, assistant naval constructor, navy yard, Portsmouth, N. H.

Ross Pelton Schlabach, assistant naval constructor, navy yard, Charleston, S. C.

Clayton Miller Simmers, assistant naval constructor, navy yard, Puget Sound, Wash.

Townsend Johnson Smith, T. S. Marvel Ship Building Co., Newburgh, N. Y.

George C. Westervelt, assistant naval constructor, navy yard, New York.

John Williams Woodruff, assistant naval constructor, United States naval station, New Orleans, La.

W. P. Stephens, yacht designer, Avenue A and Thirty-second street, Bayonne, N. J.

Juniors.

Lawrence E. Chapman, Massachusetts Institute of Technology, Boston, Mass.

Torjorn Hermanrud, draftsman, Fore River Ship Building Co., Quincy, Mass.

John D. Schmidt, student, Webb's academy, New York City.

A. Harold Jansson, draftsman, experimental model basin, navy yard, Washington, D. C.

Roy P. Mills, draughtsman, hull division, navy yard, New York.

Amendment to By-Laws.

An amendment of the by-laws, adding the following words to paragraph 5, section 3, article 2, referring to Junior members, was adopted:

"When they are twenty-six years of age, they shall be offered the option of being transferred to active or associate membership, if they duly qualify; but if they do not accept such offer or do not qualify, they shall be dropped from the rolls of the society."

President Taylor's Address.

President Stevenson Taylor, in his presidential address, said:

"I thank you again for the great honor you have conferred upon me. You have placed me in the position heretofore occupied during the existence of this society, by two men most distinguished in their careers—Clement A. Griscom, who stands foremost among those interested in American shipping, and Francis T. Bowles, former constructor-in-chief with rank of rear admiral, and now the head of one of the large ship building plants of the United States.

"These gentlemen gave a great deal of thought and time in their endeavors to organize and carry on this society, and to their endeavors the success of the society has been very largely due.

"We endeavored to have these distinguished past presidents at this meeting, but Mr. Griscom had made previously important engagements which prevent his presence, and, as you are all aware, Admiral Bowles has met, in the recent loss of his son, a great bereavement, in which he and his family have, I know, your heartfelt sympathy.

"The past presidents have a reputation which seems to me difficult to live up to, and I can only assure you of my intended conscientious attention to your interests with the hope that they may not be entirely in vain and I trust that at the completion of my term of office I may at least deserve the centuries-old commendation, 'Well done, good and faithful servant!'

"I congratulate the society on its mem-

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bership, which will at this meeting be increased by at least forty members. This more than offsets the losses due to deaths and resignations, which amounted to twenty-six during the past year.

"There are yet a number of young men in our shipyards and engine building establishments to whom our proceedings would be of great advantage, and I desire that you shall bring them into our fold for their benefit as well as ours.

"The moderate dues hardly pay for the publishing of the proceedings and the better and more numerous the proceedings the greater the cost. I suggest that for the future benefit of the society such of you as may deem it feasible and wise shall become life members, thus creating a fund, which, as the years go by, will add to your regular income.

"The treasurer's report, as printed, shows clearly our financial condition, and at its meeting yesterday, the council wisely reduced some of the nominal assets, as will be duly reported to you.

Progress in Marine Engineering.

"There have been no special advances in the art and science of ship and engine building, for at the present time we seem to be in a period of development. Progress is being made in the application of a combination of reciprocating and turbine engines for marine use, and of a combination of fast running turbines with gearing for slow going vessels. Further developments in these directions are awaited with great interest, as will be also the use of producer gas and gasoline engines of larger units than have heretofore been tried.

"Our navy, in importance, quality and size of ships, if not in number, compares favorably with the navies of the world.

"Following in some respects the example of the later great merchant ships built abroad, battleships have increased in dimensions, displacement, speed and ordnance to a remarkable degree. In this connection, the first paper of today's meeting, written by our distinguished honorary member, Sir William White, whose career as naval constructor in England is so well known, presents views on the growth of war vessels and on the eternal question, guns versus armor, armor versus guns. This paper will particularly interest not only those of you who are responsible for our navy, but those who are directly responsible for the vessels of all other navies. I commend it to your careful consideration.

"There has been a great development in the past few years in that branch of mechanics which may be termed aeronautics. The improvements in both dirigibles and aeroplanes, particularly in the latter, have been marvelous. It is but five or six years since man made a flight of a few feet with a heavier than air machine. During the past year, flights of distance and altitude have been made that were hardly dreamed possible, but a short time ago. To what uses these wonders of the air may come, it is dangerous to predict more particularly as to their limitations, for in the light of the achievements of the past quarter of a century it is a bold man or foolish one, as you may look at it, who says that any particular accomplishment is impossible.

"Unfortunately for true scientific progress, the recent aeronautic exhibitions have been of the hippodrome order, not commanding our highest respect.

"Though submarines have accomplished great feats, experiments are still being made to add to their efficiency.

Oil Fuel for Steamers.

"Oil fuel, applied for marine use, has passed the experimental stage. Excellent results have been accomplished and many advantages proven. Where coal is scarce and oil is plenty, oil fuel is naturally used to great advantage, but the storage, the safety in use, and the procuring of oil of the same quality at all times are yet sufficiently experimental to warrant the study still given to this subject where coal is cheaper than oil.

"So in all the varied branches of our professions we are still achieving, still pursuing.

"In the beginning of this year, this society was honored by the Institution of Naval Architects of England by its invitation to join in a Jubilee Meeting in London, celebrating the fiftieth anniversary of the founding of that most distinguished society. As you know too well, the death of their beloved King Edward VII compelled a postponement of their celebration, and with that great people, in common with the rest of the world, this nation mourned.

"We are now advised that the Jubilee Meeting will be held in London, commencing July 4 next, and I can assure you that those who may be so fortunate as to be able to accept their cordial invitation, will receive a warm welcome. May many of you go.

Aiding Our Merchant Marine.

"One subject near to our hearts is that of the American Merchant Marine. 'Hope deferred maketh the heart sick,' and the hopes deferred in this matter have almost caused heart failure.

"Protection has been the leading theory and practice of great political parties and has led the country at large into great prosperity. Everything going into a ship has been amply protected, excepting the building thereof. The very protection given various materials and labor in the manufacturing of them has so added to the cost of building ships that it is impossible to compete with the cheaper labor and materials of foreign countries, and yet the word 'subsidy' substituted for the word 'protection' has, for some curious reasons, become almost disreputable and the cry is raised—shall we spend public money for the benefit of a few shipbuilders? Had this thought obtained to any degree in relation to the many large industries of the country so well fostered by the tariff, there today would have been a dependence on foreign manufacturers truly deplorable, and a billion dollar congress impossible.

"One great difficulty with the subject of legislation tending to increase the merchant marine is that the advocates, though they see clearly the great need and the public advantage of an adequate merchant marine, have such varied methods of accomplishing the desired result.

We Must Have Ships and Yards.

"For my own part, I have come to the conclusion that a subsidy for establishing lines to South America, or other specific countries, that extra payments for carrying mails and for tonnage and speed, in short that the various methods of special rewards are entirely futile; and that there only remains for us to go back to the practice of our forefathers and establish discriminating duties. This is not the time for arguments on this question, and opinions may change. I know that strong men differ, but we are like the children in Maeterlinck's fairy play, looking in various directions for our particular 'Blue Bird;' and finding it not; and some day, not too far off, I trust, the people of this great nation with its thousands of miles of seaboard, with its great protective navy, which in the final analysis must depend upon a merchant marine, with its many and large productions from the soil, and from its varied manufactures, will realize the supreme importance of having ships and yards in which to build them, will realize that we are today deliberately passing to foreigners annually enormous sums which should be earned by our own citizens; and they will come to themselves, will unite on the right course, will demand from their representatives a change in the present condition, and they will get it. So be of good cheer. Let your hearts faint not.

"One of the best features of these society meetings is the social side of them. Here we gather annually, many of you rivals in intense competition

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during the remainder of the year, but here friends, renewing acquaintance and reviewing accomplishments. I know of no better way of avoiding misunderstandings, heartburns and ill-feelings, than getting together in these meetings, and I am proud to say that in this particular this society has been exceedingly fortunate.

Social Side of the Meetings.

"Let me urge you to continue this good course. Let the younger members not hesitate to make themselves known to the elders and the elders not forget their own struggles in youth. Be ready to extend helpful thoughts to each other, and remember, though you cannot see the growth of shipbuilding as you desire, you are members of a profession second to none in building material things. Your members may be comparatively small, but you combine in yourselves the knowledge and the skill of all of the other special mechanical and engineering societies, and your problems are more difficult to solve." (Applause.)

Loving Cup for Admiral Bowles.

The special committee, appointed at the 1909 meeting, to prepare some suitable recognition of the services of Admiral Bowles to the society, recommended to the council that a loving cup be presented to the admiral and submitted the following appreciation:

"The services of Admiral Bowles to the Society of Naval Architects and Marine Engineers in connection with its formation and development, are too definitely indicated in the proceedings of the society and are also too well known to its individual membership to require any extensive enumeration, even for purposes of historial record. It seems most fitting, however, that formal mention be made of the facts that he was one of the principal organizers and incorporators of the society, was the first chairman of its executive committee, and served for a period of five years as its secretary, and more than five years as its president. Such a record of accomplishment speaks for itself, and any added force, which might be given through formal expression by this committee, is believed to be best conveyed by quoting some remarks made by the late lamented Commodore Loring, one of the founders and original vice presidents of this society. These remarks were made by Commodore Loring on the closing day of the first annual meeting of the society, in proposing a vote of thanks to Admiral Bowles, and were as follows:

"'Mr. President and Gentlemen:—There has devolved upon me the very agreeable task of proposing a vote of thanks to one whose happy idea is responsible for the pleasure and profit we have derived from the inaugural meeting of this society.

Recalling Commodore Loring's Remarks.

"'While individual commendation is, in general, to be deprecated, historical accuracy is never amiss, and the first volume of the published transactions of this society would not be complete did it not contain a formal recognition of the services of one whose felicitous conception, aided by your generous and united efforts has culminated in such gratifying results.

"'As Col. Stevens so aptly pointed out at the banquet last evening, our society now needs no sponsor, but we must not forget that this success, thorough and incontrovertible though it be, has been the result of studious thought and painstaking care.

"'In all the work of inception and execution, the master mind and guiding hand have been those of Naval Constructor Francis T. Bowles, and it is to his unerring skill and tact, and untiring devotion that we are indebted for the formation of a society which will always be a means of professional advancement, and which cannot but prove a potent factor in the reawakening of general interest in our shipbuilding development, and in the ultimate attainment of that maritime supremacy which once was ours, and must in the future inevitably return.'

Resolution of Appreciation.

"The unusual tribute to Admiral Bowles, made by Commodore Loring in 1893, in proposing the society's vote of thanks to that gentleman, was seconded by Col. Stevens and unanimously endorsed by the society. In the years of development of the society, which followed, the subject of this tribute, through his earnest, loyal and devoted service to its best interests, has not only justified the original tribute, but placed the society under renewed obligations which have found appreciation in his election to the highest office in the gift of his colleagues. As a further mark of appreciation of the services of its late president, the committee recommends to the society for its approval, the following resolution:

"'*Resolved*—That the Society of Naval Architects and Marine Engineers desires to avail itself of this first opportunity since the completion of his term of office as president, to give formal expression of its appreciation of the services of Rear-Admiral Francis Tiffany Bowles, whose skill, tact and untiring devotion—first, as organizer, and later, as secretary and president, contributed in so conspicuous a degree to the development of the society and its present assured position among scientific institutions; and that in furtherance of the foregoing expression of appreciation, the president is directed to have this resolution and the accompanying report of the committee recorded in the minutes of the society, and a copy thereof suitably engrossed and forwarded to Admiral Bowles.'

"Very respectfully—W. L. Capps, chairman; Stevenson Taylor, ex-officio; E. A. Stevens, Geo. E. Weed, Andrew Fletcher and W. J. Baxter."

The report was adopted. The loving cup was presented to the admiral at the banquet on Friday evening.

Notes on the Armaments of Battleships

THE society then proceeded to the reading of the papers. The first paper presented was "Notes on the Armaments of Battleships," by Sir William H. White, which was read by D. H. Cox. Following is an abstract of its principal features:

Wide and deep differences of opinion prevail in regard to this subject; as a consequence, it may be anticipated that conclusions which the writer has reached will be challenged and declared to be unsound. Nothing but good can result from discussion and criticism when they are conducted on proper and temperate lines as they will be in this society; and consequently the writer has not hesitated to express freely his dissent from doctrines which other persons have set forth in dealing with the subject, and will not object to equally free criticism being made of the following statement of principles to which he has been led by study and experience during the 43 years that have elapsed since he first joined the constructive department of the British Admiralty.

One fundamental idea has governed the armaments of warships in all ages: viz., the desire to provide means of offense which will enable a ship making an attack to put her enemy "out of action" in the shortest possible time and insure the least possible damage to the attacking ship during the conflict. It may be admitted also that, under modern

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conditions, an active offense is no longer the only means of defense; but, on the other side, it cannot be denied that an active offense is still and always must continue to be the best means of defense. It gives the greatest assurance of victory—in other words, the greatest probability of putting an enemy "out of action."

Victory never has depended and never will depend entirely upon the destruction or capture of an enemy's ships, but upon their being brought into a condition of incapacity to continue the struggle—that is to say, being put out of action. That result may be attained in many ways, but it must be reached in some way before victory is secured. Looking back upon the great wars of the eighteenth and beginning of the nineteenth century, it is seen that ships were put out of action by the destruction of or serious damage to their means of propulsion, to their mobility and maneuvering power; by being set on fire; by slaughter of their crews; by loss of morale; by panic arising from accident or damage which prevented continued utilization of existing means of offense; by overpowering or seriously injuring the armaments, and in other ways that need not be particularized.

From the point of view of this paper, the question to be considered may be stated, therefore, as follows:—What description of armament is likely to prove most effective for speedily putting out of action modern battleships, having regard to existing materials of construction, structural arrangement, armor defense, means of propulsion and maneuvering; as well as to the characteristic qualities of guns, projectiles, explosives, torpedoes and mines now available for use? It will be assumed that there is no need to recapitulate the remarkable advances which have been made during the last half century.

Certain features may be assumed to lie outside the field of discussion. It is agreed that naval actions will be fought at longer ranges than in the past. The reasons for this are to be found, on one side, in the development of locomotive torpedoes, while on the other side stand improvements in naval gunnery.

Long Fighting Range and Secondary Armaments.

In regard to the probable fighting range for future naval actions there are marked differences of opinion. Two distinct schools of thought exist as to the minimum range likely to occur in practice. One asserts that an extremely long range will be chosen and maintained by commanders whose fleets possess greater speed and whose ships are armed on the "single-caliber, big-gun" principle; and it is argued that at this great range vessels so armed will be able speedily to put out of action an enemy's ships which individually carry fewer big guns, although these may also possess powerful and well-protected secondary armaments.

The other school maintains that, although actions may be begun at very long ranges on occasions when atmospheric conditions are favorable, average conditions of weather at sea will not favor that kind of attack nor make its results decisive.

In their judgment, it is desirable to associate with big guns a powerful secondary armament of quick-firing guns, adequately protected and so placed as to be efficient both in horizontal command and in height above water, while free from interference arising from independent firing of heavy guns.

The Number of Heavy Guns to be Mounted.

As to the most suitable numbers and calibers of guns, making up the secondary armaments of modern battleships, little need be added. There are obvious objections to the employment of many calibers, each requiring special ammunition and making separate control desirable. In some ships, guns of 6-in., 4.7-in., 3-in. and smaller calibers have been mounted. The writer has long advocated a simpler arrangement which, in his judgment, would fulfill all requirements, and ventures to quote remarks on this head, made at the Institution of Naval Architects, a few months ago:

> The ideal armament, to my mind, is that which embodies a certain and not an extravagant number of heavy guns, associated with a considerable battery of 6-in. guns. It does not seem to me a difficult matter to supply these 6-in. guns with ammunition which shall be efficient when used against attacking torpedo vessels. If anything, in addition to such a secondary armament of 6-in. guns is wanted I should say "man killing" guns capable of very rapid fire might be used for sweeping the decks of torpedo vessels; they could be placed and fought in almost any position and would require only shield protection.

The main reason for preferring a caliber of about 6 in. is that experience proves projectiles of about 100 pounds weight to be the maximum which can be "man-handled" continuously and rapidly; while accuracy of fire even at long range can be combined with rapidity of discharge and remarkable effectiveness against the lightly armored, unarmored and vulnerable points of warships.

Turning to the consideration of what constitutes a reasonable number of heavy guns for the principal armament of a modern battleship, it will suffice to restate the writer's conclusions and to briefly summarize the reasons therefor. These conclusions are admittedly open to debate and other views may be maintained on the basis of solid argument.

There are two positions for heavy guns which confer supreme advantages, and are always utilized. These are at the center line; one commanding right-ahead, with large arcs of training reaching well abaft the beam; the other commanding right astern and over large areas, reaching well before the beam. Until the Michigan and South Carolina were designed, it was the general practice to mount one or two heavy guns—two in nearly all cases—in each of these positions. Superposed turrets were tried in some cases, and 8-in. guns were mounted in the upper emplacement; but this practice did not find much favor and may be considered to have dropped out of use. It was a new and bold departure in the Michigan and South Carolina to place two turrets in each of the supreme positions, and to arrange for firing the guns in one turret over the top of the other turret. That arrangement proved successful, however, and has been largely adopted in recent ships of all navies.

The writer has always favored and still favors the system of mounting heavy guns in pairs. French designers long preferred separate mountings for single heavy guns, but subsequently abandoned the arrangement. Considerable economy is thus effected in the weight of the mountings and armor protection for a pair of heavy guns as compared with what is needed with separate mountings for each gun; and although the risk of simultaneous disablement of two guns is necessarily incurred when they are carried on a single turntable and within the same armored station, that does not seem to be an undue risk.

For more than 20 years, the heavy guns of most battleships continued to be four in number, and in nearly all cases they were mounted in pairs on the center line of the deck at the two important positions above described. In connection with the introduction of the latest types of battleships—usually described as "Dreadnoughts"—a necessity arose for finding other positions for heavy guns. Ten or twelve such guns have been usually thought desirable; thirteen guns are to be carried in ships now building.

During the last five years we have seen both the old French disposition and the echelon arrangement reproduced (in principle) in new designs, only to be abandoned in later designs, in some cases before practical experience had been gained with the arrangement which was abandoned. Now there is a marked disposition to place all the heavy-gun stations at the center line of the deck, so that all the guns may be available on both broadsides. It may be noted

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that the United States navy took the lead in this last movement, and further has the credit of demonstrating the possibility of associating powerful bow and stern fire with the maximum of broadside fire over large arcs of training, by placing some turrets higher than others and firing over the lower turrets on certain bearings.

Objections to Large Numbers of Heavy Guns.

Multiplication of gun positions has been necessarily accompanied by considerable increase in the length of battleships even when the protection and speeds have remained practically unchanged. As a contrast we may take the Arkansas with a length of 545 ft. and twelve 12-in. guns as compared with the Florida of 510 ft. in length with ten 12-in. guns. It is true, of course, that increase of speed has even greater influence on dimensions and especially on length; but it is certainly remarkable to note the construction of armored ships which are about 700 ft. in length and yet carry only eight heavy guns in four positions (13.5-in. caliber) whereas only five years ago ships about 200 ft. shorter carried ten heavy guns (12-in.) in five positions, and others about 250 ft. shorter carried twelve heavy guns (11-in.) in six positions. Such additions to length may not be considered objectionable on the ground of diminished maneuvering power, in view of the facts that in future long-range fighting will be the fashion, that by various devices their handiness has been increased in proportion to their dimensions.

Under-water attacks by torpedoes, by submarines and by mines are undoubtedly among the greatest dangers to which modern warships are exposed, although the gun still remains the supreme weapon of offense. It is agreed that a single successful blow struck by a modern torpedo will probably produce damage which will put even the largest ship "out of action," although she may not be sunk. On this ground, therefore, it may be maintained that a limit ought to be put upon the concentration of gun armaments upon single ships, and upon the increase in dimensions and costs of individual ships; because a single successful blow may, by general consent, bring about such a serious proportionate loss to a fleet by injury to one vessel and her compulsory withdrawal from action. Moreover, many services are required from a fleet in the performance of which capacity for distributing the force is no less important than the power of concentrating it for an attack. From this point of view unlimited increase in dimensions, cost and individual power of battleships is not desirable. As to the assertion that increased steadiness of ships, considered as gun platforms, necessarily proceeds *pari passu* with increased dimensions, it need only be said that experience has proved the doctrine to be fallacious. It is a matter of common knowledge that some of the steadiest warships ever built have been vessels which were of small dimensions when judged by present standards. This feature in behavior, of course, is distinct from the power of maintaining speed in a sea-way; that quality is undoubtedly favored by increase in length and weight.

No claim is made that new statements of the case have been embodied in the foregoing summary of points in favor of or adverse to the adoption of battleship armaments comprising a large number of heavy guns in each vessel. All that has been attempted is to bring such points into view, fairly and briefly. Having done so, the writer desires to place on record his personal opinion that in no case is it desirable to carry more than eight heavy guns in a single ship, that these guns are best arranged in four positions as in the Michigan class, and that they should be supplemented by a powerful and well protected secondary armament.

Discussion on Sir William White's Paper.

THE CHAIRMAN:—You must have noted with pleasure the inferential compliment paid to our own naval constructors by Sir William, that it was a new and bold departure in the Michigan and South Carolina to place two turrets in each of the supreme positions, and to arrange for firing the guns in one turret over the top of the other turret. This paper is now before you for discussion, and I wish to say that the discussion is not to be limited to the actual membership. Any gentleman on the floor will be very gladly heard in these discussions. Perhaps it would be well for the secretary to read the written discussion first.

SECRETARY BAXTER: — The secretary would like to state that owing to certain unfortunate circumstances existing in New York recently, the papers have had to be handled by mail, and he has been unable to distribute to numerous people who will discuss this question with pleasure, and further written discussions are expected from our own people, or naval officers, even though they do not belong to the society, and also from various people abroad, which will all be printed in due time. I will now read a memorandum I have from Admiral Mahan on this paper.

Admiral Mahan's Discussion.

ADMIRAL A. T. MAHAN (communicated):—Your letter of Nov. 11 has reached me rather late for discussion of Sir William White's paper, which it encloses. My comment upon the paper, which I have read carefully, must therefore be confined to a brief expression of my general agreement with the conclusions of Sir William White and the following summary of the leading principles I conceive to be involved in the controversy between the all-big-gun ship, which, barring torpedo defense, is to carry no armament except a few of the very heaviest caliber used by its nation, and the mixed battery vessel, which, to fewer of the heaviest guns, adds a proportioned number of comparatively light pieces, variously called secondary, or intermediate. This is the type which commands the adhesion of Sir William White.

The argument for the all-big-gun ship, briefly, is that it, and the squadron to which it belongs, will always be able to keep at its own desired range; and that, being so able, it can and will always choose such a distance that the smaller guns of its opponents will be practically "out of action;" an aim which Sir William White accurately quotes as that of all ship fighting. Under this condition, the circumstances of the two fleets are reduced to the most heavy guns of the all-big-gun fleet opposed to the fewer of the mixed-battery fleet.

The reply to this is, that the fleet speed of any body of vessels is the speed of the slowest among them; and the maintenance of the all-big-gun distance pre-supposes a perpetual avoidance of close action by the fleet depending upon it—that is, constant withdrawal; that any mishap lessening the speed of a single member of the fleet entails the abandonment of that member, or the acceptance of close action, within the range of the mixed battery. The pursuing fleet follows with its best speed, because its slower members are in no danger, and will come up as a reserve.

Accuracy of Guns.

Much stronger assertion is made as to the inferior accuracy of the smaller caliber, under conditions of modern action. Sir William White tells us that naval officers having full and accurate information on this subject have assured him that the percentage of hits obtained with 6-in. guns under service conditions is not inferior to percentages obtained with guns of larger caliber. Accepting this, and also that, as was the case with battleships but a few years ago, three 6-in. are carried for one 12-in. gun, the number of 6-in. hits "under service con-

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ditions" would be to 12-in. as three to one. This is "volume of fire." Considering the large amount of surface penetrable, and of crew accessible, to 6-in. projectiles, it is a very material consideration. It is to be remembered that the 6-in. projectile weighs 100 lbs., and that the repeated near burstings of such in rapid succession, even where they do not penetrate, is a tremendous nervous strain upon men subjected to them. This the Russians experienced at Taushima.

The very striking success of the system of fire control, developed within the past few years, has led those to whom the credit of this belongs, to insist much upon the difficulty of observation of the fall of projectiles, where two calibers are used. The splash of the 12-in. and of the 6-in. are often indistinguishable. I think this argument presupposes a deliberateness of fire control which will not obtain after the action becomes "hot." Till then, like two fencers, measuring each other's strength, there may be "passes" with the 12-in. on each side, to ascertain distance, and this will—and should—continue as long as possible. How long, is the question.

Increase in Caliber.

The all-big-gun conception leads necessarily to the wish for as many such guns as possible; or, what in aggregate impact is much the same, to each gun being made of as large caliber as possible. We have now risen from four big guns to twelve or thirteen; and from 12-in. to 14-in. The notorious difficulty of placing several pairs, shown by Sir William White, necessarily of itself impels to fewer pairs of heavier guns. This means, of course, proportionately fewer discharges and fewer hits. All is staked on the disastrous effect of the large projectile, hitting less often; just as, against a mixed battery, all is staked on the secondary (or intermediate) battery—the 6-in. guns—being kept out of action by superior speed.

The assumption of the advocates of all-big-gun ships are precarious, though plausible. Chief among them is the assured ability to choose distance, at least for a time, long enough to cripple the assailant decisively. This is the corner-stone of the whole edifice. Upon this is built up the entire program; more and more big-gun fire, therefore, bigger guns with fewer emplacements; bigger and bigger ships and fewer of them. Sight is lost of the fact, which Sir William brings forward, that the guns in three ships can be brought to bear effectively on the same number in two ships. This is concentration of fire; while the three ships, as compared with the two, give dispersion of target, a defensive provision entailing little offensive loss. This is exactly as in harbor defense; guns bearing from numerous positions on a critical point, concentrate fire, yet gain comparative immunity through their separateness—dispersion of target.

Concentration of Fire.

The efficacy of bigger ships and fewer of them depends in part upon the considerations of concentration of fire—upon a few ships; and upon dispersion of target—among several ships, or gun emplacements. A bigger ship has an evident advantage over a smaller, in a ship duel. In a fleet action, the bigger ship reinforces proportionately the position in the fleet in which she is placed. But it does not follow that in a combat of two ships against three, or eight against twelve, the same inequality continues. The dispersion of the target among twelve ships, the localization of a severe injury in one smaller ship instead of one bigger, the larger power of combination in twelve units over that in eight, all tend not only to compensate but to overcome the concentrated power (not concentrated fire) of the larger vessel, which is conspicuous in a ship duel.

The question ultimately is the difficult one of drawing a line. No one, for instance, wants one-gun ships, but a respectable school revolts at the twelve all-big-guns; and the revolt is greater when more are proposed with increasing size of vessel and reduced numbers in the fleet. Collateral questions arise, e. g., dockage for such vessels and their use of navigable waters. Already Chesapeake Bay is found too shoal for the increased draughts of battleships.

In conclusion, Sir William White mentions that the Japanese have not abandoned the secondary or intermediate battery. I believe that this is also true of the German navy, if not indeed of all save the British.

Prof. Hovgaard's Discussion.

PROF. WILLIAM HOVGAARD:—This paper puts the question of the armament of battleships in a remarkably clear way; it disentagles in an analytical manner the different factors which influence the problem, and makes it relatively easy to evaluate them and to assign to each of them their proper weight.

(1) *Disposition of Guns.*—I fully agree with Sir William White that when the end positions are utilized by placing two turrets at each end of the ship, mounted as in the Michigan, any further addition to the number of gun turrets is undesired, since it can only be made by sacrificing, to some extent, the arc of fire of such additional guns, and by incurring interference. The Michigan arrangement seems indeed the ideal.

On the other hand, it appears to me that if it is possible to design or rather to develop an efficient triple turret, this installation should be adopted. We shall thereby be able to mount twelve guns in one ship, all of which shall have the maximum arc of fire. At the same time all the advantages inherent in the Michigan arrangement will be retained, *viz.*: Favorable conditions for storage of ammunition, freedom from gun interference and facility of mounting a powerful secondary battery. The relative risk by thus concentrating three guns in each turret will not be greater than incurred by the twin turrets in the Michigan, since in both cases 25 per cent of the primary battery will be put out of action by the disablement of one turret, and the target presented by four triple turrets is smaller than that presented by six twin turrets.

The tactical concentration obtained by mounting, for instance, 24 guns in two ships instead of in three ships seems to me an undoubted advantage.

(2) *Anti-Torpedo-Boat Battery.*—If, in addition to the 6-in. guns, proposed by the author, a battery of lighter "man-killing" guns are to be carried, it appears to me best to place them on disappearing mountings, such as those designed by the Creusot firm in France, where these guns are lowered when not in use, so as to be sheltered by the side armor. The number of such guns must then be reduced, but it seems better to possess a smaller number of protected guns than a greater number of guns, which are almost certain to be demolished in ship or fleet actions.

(3) *Caliber of Guns.*—Even if it be granted that the technical difficulties, which stand in the way of increasing the caliber, may be solved satisfactorily, so that these heavier guns may be worked as quickly as the present 12-in. guns and so that they may have as long a life, it still remains to be proved, as pointed out by Sir William, that equally good or even better results cannot be obtained with 12-in. guns.

The heavy guns are, to my mind, essentially armor-piercers, and armor piercing can only be done by heavy guns. The larger guns now being introduced are, however, to be superior to the present 12-in. guns, chiefly in their greater shell effect, it being generally admitted that the armor-piercing effect of the 12-in. guns is adequate. Now, shell effect can not generally be expected to affect the vitals of a ship directly, its action is based on a demolition of unarmored or lightly armored

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parts, and is essentially external. This work is indeed very important, but may perhaps better be carried out by a greater number of 12-in. guns which give a more widespread fire than by the concentrated effect of a smaller number of heavy guns.

The armor-piercing effect has much greater chances of reaching the vitals, of dealing deadly blows, and the greater number of 12-in. hits sums here preferable to a smaller number of say 14-in. hits, the individual effect of which is not much greater.

It must be borne in mind also, that with a given number and disposition of guns, an increase in caliber means an increase in displacement, and this leads up to the main point which I want to discuss, viz., whether such addition to the displacement and hence to the load carried is not much better employed in strengthening the torpedo armament and the protection against sub-marine attack.

(4) *An Increase in the Torpedo Armament of Battleships and in Their Submarine Protection.*—It will probably be objected by many, that it is of no use to fit a powerful torpedo battery in battleships, since future battles will be fought on great ranges. The torpedo is, in other words, regarded merely as a defensive weapon which, so it is thought, forces the ships to keep on long ranges. This doctrine of long range fighting, which has become so generally accepted during the peace period following the Japanese war, is not supported in a definite manner by the experiences of that war, it certainly breaks down in thick weather and under many circumstances, due to navigational difficulties. But also from a purely tactical point of view, the doctrine seems open to serious criticism. History furnishes an abundance of examples where similar theories have been exploded, both on land and sea.

The Tactics of Frederick.

Before the time of Frederick the Great, it was considered the highest art of strategy and tactics to try to secure secondary advantages by the occupation of outlying fortresses or territories of the enemy, by securing strategical bases and by overwhelming and defeating minor detached forces, while decisive action against the main army of the enemy was avoided. Frederick the Great broke entirely with this custom; he went right for the enemy's main army, fought it and destroyed it. He was severely criticized for this unscientific method by contemporary strategists, but he always beat his enemies. Precisely the same strategy and tactics were followed by Napoleon, no maneuvering about the enemy at great distance, but decisive blows at close quarters was his principle.

Nelson had the same principle. Before his time fleets would keep going at great ranges, sailing along parallel lines, firing for whole days at each other, without much result, but Nelson broke completely away from these tactics. Thus at Trafalgar he sent Collingwood right through the enemy's line, thereby exposing his ships to a dangerous fire, but gaining the decided advantage of afterwards concentrating a great force on a wing of the enemy at close quarters.

I do not mean to intimate that ships will fight at so close ranges in future battles as was the case at the time of Nelson, but it seems to me quite possible that commanders may be found who will prefer fighting at ranges of a few thousand yards, and who will use their superiority in speed, if any, in trying to close in with the enemy instead of running out to maximum range.

This seems the more likely to occur if we equip the battleships as I propose, by giving them, on the one hand, a powerful torpedo battery, and on the other a stronger underwater protection.

A Plea for the Torpedo.

As I have shown elsewhere (Jane's Fighting Ships, 1910), it is quite possible, on a displacement which is not now considered excessive, to endow a ship with a powerful armament of 12-in. guns, with a battery of some twenty-four submerged torpedo tubes and with a 4-in. underwater armor, placed externally on the bottom of the ship; the speed to be at least one knot more than the ordinary battleship speed. A battleship of same size of the type now in vogue, armed with a number of say 14-in. guns, but with only four to five torpedo tubes and with a relatively weak bottom, will stand very little chance of surviving an action at close ranges with a ship of the above proposed type.

I believe that the attention has been fixed too much on the artillery. In the struggle for the attainment of supremacy in this respect, it appears that the torpedo has been forgotten or put in the background.

The development has become one-sided and the result has been inharmonious designs, for while the modern dreadnoughts are extremely powerful in some respects, they are very weak in others.

Quite apart from the question of torpedo armament, it has become a necessity to give the battleships a much better protection against submarine attack than is at present the case. This is due to the fact that the torpedo itself, as well as the vessels which carry torpedoes as primary armaments and notably submarine boats, have recently developed to the point where the risks of destruction now encountered by battleships due to submarine attack are at least as great as those due to attack by artillery.

We should, however, never increase the weight given to the defensive in a battleship, without at the same time increasing the weight given to the offensive, and a more powerful torpedo armament is the natural correlative of the underwater protection.

Constructor Taylor's Discussion.

NAVAL CONSTRUCTOR, DAVID W. TAYLOR (communicated):—The society is to be congratulated that the distinguished author of this paper should have enriched its proceedings with a contribution on a subject of vital interest to so many of our members and based upon professional experience unsurpassed by any naval architect today. If there are those among us who materially disagree with him on some points, they should be prepared to bring forward substantial facts and figures to sustain their position.

It seems to me, however, that the majority of the conclusions of the author will be accepted by those who have given much consideration to the subject matter.

Certainly, as regards the disposition of heavy guns, recommended, it cannot but be pleasing to the distinguished member of our society who was responsible for the bold departure taken upon the Michigan and South Carolina to find the author, not only endorsing it, but pointing out the fact that it has been largely copied in other navies. "Imitation is the sincerest form of flattery." I would like to point out, however, in this connection, that the "vertical echelon" disposition of turrets upon the Michigan and South Carolina was not adopted until careful and thorough experiment had shown its entire feasibility. The great question was, whether it would be possible to fire the two guns of the upper turret immediately over the lower turret. To determine this question, a 12-in. gun was mounted on the monitor Florida (now Tallahassee), so as to fire over the turret, and firing trials carried out, there being imprisoned in the turret, I believe, first cats and dogs, then midshipmen and so on, up to rear admirals. After the question of safety was settled, there were, of course, a number of other questions of prime importance, such as the provision of adequate strength in the supports of the upper turret, the sighting arrangements for the lower turret, etc. The results of target practice of the four vessels of the fleet now in service with the "vertical echelon" ar-

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rangement of turret have been, I may say, very good, indicating that the many problems of the constructor and ordnance engineer involved by the new departure were successfully solved.

Favors the Michigan Arrangement.

The author believes in the four-turret disposition of the Michigan, as against five or six turrets, as found on later ships. This opinion is shared by many of the most capable and experienced officers in the United States service; but it is not possible to install the number of heavy guns demanded by the majority of our officers in four-gun positions unless we use three-gun turrets.

The author is not in favor of the triple-gun turret, although he does not take strong ground against it. He says, in effect, that only war experience could finally settle the question of its desirability. On this point, I would like to mildly disagree with the author, and record my opinion that war experience may be most deceiving. If we could have a war lasting several years, with a battle every month, the experience gained would, of course, be conclusive as regards practically all professional questions. But when there is but a single battle or two, at most, the elements of chance may very well entirely obscure the result as regards technical matters. We naturally draw as many conclusions as possible from the practical experience of war; but, I repeat, that results of a single battle may well lead us to fallacious conclusions.

The Passing of the Ram.

At the battle of Lissa, in 1870, the victors used ramming tactics most successfully, and, for years, every navy in the world attached great importance to the ram. When we undertook the reconstruction of the navy, about 1881, a number of rams were recommended by the first advisory board, and finally we built one upon the ideas of a most distinguished officer, completing it more than twenty years after the battle of Lissa.

By that time, however, the development of the gun and torpedo had practically wiped out the chances of successful ramming, and the experience of the battle of Lissa is not now regarded as warranting any importance being attached to the ram as a naval weapon.

It is very doubtful if it really warranted the importance attached to the ram during the few years immediately subsequent to the battle.

There is a good old English proverb, which, it seems to me, should always be borne in mind when we undertake to learn the "lessons" from a naval battle, namely "One swallow does not make a summer."

In his advocacy of good secondary armaments, the author takes strong ground on one side of a much debated question, and produces strong arguments for his contention.

Disposition of Secondary Armament.

There is no question that, today the disposition and protection of the secondary armament of a large battleship is about the most puzzling problem to be dealt with of the whole design, and happy the designer who has no secondary armament to contend with. In the Michigan and South Carolina, we had practically no secondary armament, because on the limits of displacement it was not possible to provide it, but we soon reverted to it.

Most nations have never given it up. England alone has practically left off a secondary armament from a number of ships. It is true that we call our secondary armament "anti-torpedo-boat guns," or some such name, but the fact remains that it is a powerful battery—the 5-in. guns we now fit being about as powerful as the 6-in. guns of a few years ago.

If we may judge the future by the past, the secondary armament will refuse to stay abandoned in any navy.

The English Dreadnought of nearly thirty years ago—the largest, fastest, most powerful vessel of her time, outclassing all others, had practically no secondary battery. About that time, the torpedo boat menace grew, and the secondary battery began. It was given a big impetus about 1884 by the destruction French quick-firing guns wrought in an affair with the Chinese, and the secondary battery grew and grew until a few years ago, it grew up to the primary battery. Immediately, however, the development of a new secondary battery began. There is little doubt that, whether logical or not, the secondary battery will persists, in spite of the difficulties connected with it, and the author's belief in 6-in. guns seems fully warranted by the almost universal practice of the present day. Indeed it seems very probable that even England will soon fall into line.

History Repeating Itself.

The statement on page 10, that "in many cases history has been repeating itself" appeals particularly to me. No one can study naval developments for even a few years back without finding many cases where naval opinion has swung around in a circle, and the author, with his experience of forty-three years, is doubtless able to recall a number of cases where the complete circle has been traversed more than once. While many naval officers are conservative, there is no question that naval opinion, as a whole, if reflected, as presumably it is, in designs of naval vessels—has during the last fifty years been in a constant process of change and re-crystallization in marked contrast to the conditions during the early part of the last century, and for at least two centuries before.

It may be interesting to recall that this period of shifting opinion is practically coincident with the development of the naval architect and marine engineer as more paramount factors in the design of naval vessels, and it might be maintained that the technical man is responsible for the incessant change in naval opinion, and not the traditionally conservative sea-going officer. (Applause.)

Admiral Capps' Discussion.

ADMIRAL WASHINGTON L. CAPPS:—It is to be regretted, I think, that officers of the ordnance and gunnery branch of the service are not here to participate in the discussion, as it deals with matters that particularly affect that branch of the service. It is also to be regretted that those of us who perhaps could speak with some authority on the matters treated are limited in the expression of our views by regulation. Some years ago, knowledge concerning naval development was much more freely disseminated. That period of ready access has been followed by one of comparatively profound secrecy. I say comparatively, because no matter how seriously you may attempt to keep things secret, those interested usually find out everything concerning them, and oftentimes you succeed in concealing a thing from your own people, who would doubtless profit by the knowledge, and those you desire particularly to conceal it from, have more or less complete information.

Sir William has very modestly stated that "no claim is made that new statements of the case have been embodied in the foregoing summary of points in favor of or adverse to the adoption of battleship armaments comprising a large number of heavy guns in each vessel. All that has been attempted is to bring such points into view, fairly and briefly."

Warship Design Subject to Varying Opinions.

I think, Sir William is to be congratulated on the very fair and impartial exposition of the case, and although he arrives at certain definite conclusions, and gives the reasons for those conclusions, I think his paper is one that can be read with the greatest pleasure, and with very little, if any, adverse criticism.

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The subject of warship design is one that is necessarily subject to many varying opinions, and the opinion of the same individual is by no means the same today that it was last year. The most we can hope for is that those charged with the responsibility of design, shall give the matter their very best service, and that those who have anything to do with such material should give to those who have the immediate responsibility for design, the benefit of their experience in every way possible. By such means the results attained will be the best possible under the circumstances.

Sir William has made most graceful allusions to the work done in the United States in recent battleship development. Of course, whether or not he is right in his tribute, must be left to others. I think, however, that all of you, as not only members of this society, but as citizens of this country, are especially interested in knowing with what care we have adopted certain principles of armament, which it is gratifying now to know have been very largely followed by our colleagues in other countries.

Middle Line Emplacement.

Sir William has stated, and I believe he is correct in the statement, that the South Carolina and Michigan represent the first groups of ships of this particular period, embodying the old middle line emplacement for heavy guns, and particularly the special form of emplacements of the turret—that is, No. 3 firing over No. 1, and No 2 over No. 4. This emplacement was not arrived at in any haphazard way; it was a matter of considerable improvement, and the time is now past, and so much publicity was given to many of the details, that I am sure I violate no confidence in giving you a brief indication of a few of the steps taken by the department before accepting and adopting that form. It had been contended by many that that system of mounting was entirely impracticable, and would prove so in service, and that while the material might stand the blast of the upper tier of guns, the personnel could not. Many experiments were made, first on shore, and subsequently by a mounting of guns exactly simulating the actual mounting which would take place on board ship. We began in a modest way with animals, with pressure gages, and then developed the full pressure by putting into the turret at the place of maximum danger, the men who were really responsible for the design. (Laughter.) Those gentlemen had witnessed all the experiments, of course, but from a comparatively safe bomb-proof location, as did all the others, but on this occasion, they had such great confidence that they went in and were promptly followed by many others, of course, and were then in position to say that it was an entirely practical arrangement and that the guns could be fired under the most disadvantageous conditions, and with practical safety and comfort to the men in the lower turrets. That in brief, is the procedure that the naval department adopted before accepting that form of mounting.

Our Development Has Been Continuous.

It is also gratifying to note that our development along that line has been quite continuous, and although our ships have varied in size and the number of guns, the principle then demonstrated has been maintained; and other very important naval powers have come to accept that principle also as being one of the best, at any rate.

I almost feel like apologizing for making this allusion, because it concerns matters in which I have had some considerable personal interest, but every one now and then reads very adverse comments about the naval material for naval purposes, and it is somewhat reassuring to know that our progress is being watched, not only with interest, but with a certain degree of expectation by other countries.

I should not attempt, for any instant, to go over the many interesting points raised by Sir William. This sort of paper is one which should bring forth a most useful forensic display from a great many interested sources, and I sincerely trust, for the information of those responsible for designs, for the information of all of us, in fact, that the written discussions of this paper will be very complete, as it will unquestionably add greatly to the value of our proceedings.

Marvelous Advances in Gunnery.

One comment made by Sir William struck me as exceedingly interesting. It is one that has been discussed before, of course, but one to which I do not think sufficient attention has been paid. We all know the marvelous advances made in gunnery during the last few years. To those who do not have access to official records, this progress is almost phenomenal. It is only a few years ago that 2,000 yards was accepted as a very reasonable battle range. We have gone now up to 7,000 and 8,000, and even to 10,000 yards and more. There is one important condition, however, that is often overlooked, in assuming that actions will take place at such long ranges, and that is a condition which no one can control, and the ill effects of which are very frequently the case in actual battle; that is, atmospheric conditions. In one very important body of water in the world, it is the rule rather than the exception, that you cannot see 2,000 yards away. It frequently happened on our own coasts that the atmosphere is so hazy that you cannot observe accurately 5,000 yards away. These atmospheric conditions must have a very important bearing on the range at which battles can be fought, so that any one who assumes that an arrangement of armament, which provides for a very long battle range, is absolutely the right one, because we will have long battle ranges, leaves out of account the important consideration. Also we have made very great strides in naval material, and I have very great faith in later developments of big-gun-ships. I am not one of those who consider that all preceding designs are worthless. Very far from it. In the event of battle, both in the main lines and in the reserve, the ships that preceded the old big-gun-ships, even will give a very fair account of themselves. So I do not think we need dismiss that branch of our service as being completed and without use.

Personally I feel very much indebted to Sir William for presenting his views in so concise and impartial a manner, and I regret that limitations imposed upon us prevent any very detailed discussion of the paper, or the presentation of facts deduced from our own professional experience.

Constructor Linnard's Discussion.

NAVAL CONSTRUCTOR, JOSEPH H. LINNARD:—Mr. President, most of the points I had thought to make a comment upon, have already been touched upon by the previous speaker, but it may be said that the paper is largely a protest against the tendency of the battleship's design. I think we all have to admit that there are fashions in ships as well as in other things, and those who protest against the fashions, are apt to find their argument, however well considered, fall frequently upon deaf ears. Fashion, although sometimes based in part upon reasoning, is also largely based upon pride. Now, that fashion in warships at the present time indicates larger displacements. No nation is willing to take a battleship that displaces less than the contemporary battleship of other nations. Nor is it willing to have a battleship of less speed, nor is it willing to have a battleship that has apparently less guns on it. The point which seems to draw least attention in the modern fashion is the question of protection, of which Prof. Hovgaard has fully spoken. Yet, to

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some of us that very question of protection seems to be the one, in which, if we are to have a fashion, the fashion should be protected.

Limitation in Number.

The tenor of Sir William's argument is the limitation of the number of guns devoted to a single ship, and this naturally falls in with the point of view of those who believe in greater protection. If we agree that displacements cannot be reduced, we can put our capital represented by displacements in armament protection or speed; and, as Prof. Hovgaard very justly remarked, it seems to many of us that we have balanced in our modern ships the part devoted to each of these features. If then, we limit the amounts devoted to armaments by reducing the number of guns, or by limiting their size, we can devote our large ship more to protection.

In the spring meeting of the British Institution of Naval Architects, a paper was read, in which the writer indicated his belief that the tendency would be to reduce protection and to increase very greatly speed, and perhaps armament; and this may be the tendency of fashion; but if the views that have been so strongly presented here this morning carry weight, it will not be the tendency of the fashion, but the fashion will be towards that of increasing protection rather than increasing armament.

Guns on Center Line.

The disposition of guns upon the center line exclusively has been touched upon by previous speakers, but the alternative arrangement by which at least a pair of turrets are placed upon the sides of the vessel, has been strongly advocated by many on the ground of increased end-on fire, which some consider extremely necessary. Even if one grant the desirability of increased end-on fire, it has never appeared to me that the arrangement of side turrets accomplishes the results desired. If we take the fire directly forward, as exemplified in the South Carolina-Michigan design, we are able to fire without danger, as has been explained by Admiral Capps, four guns directly ahead. Nominally, we are able to fire six guns directly ahead, with three turrets arranged one in the center line, and two on the sides; but I believe I will be sustained by officers who have managed battles and turrets and gun-fire, that this is not a practical proposition. In other words, a ship cannot be steered exactly to an object—the cartridge or the enemy—and will, even if it is approaching directly, sheer off to one side or another in its progress. Now, it takes but a very small angle in any of these arrangements with side turrets, to blank one turret or the other, so that for all practical purposes, the center turrets and the turrets on one side or the other are the ones that are fired, but not both of the side turrets in the circumstances in which ships are steered at sea; and even momentarily if we can fire the three turrets directly forward or aft, it is obvious, in an attack at least, that position cannot continue any length of time without bringing the two enemies—the ships opposing—in contact, and hence can but momentarily exist. The question of secondary batteries is somewhat complicated by the progress in size and weight of guns with nominally the same caliber, and it may be said that the latest 5-in. guns we are using on our ships have practically the same weight as the 6-in. guns of an earlier date; so that the 5-in. guns we have mounted may be in a way practically described as 6-in. guns with a 5-in. hole in them, and we consider such guns mounted in positions in which they can be used in action against other ships, it seems sufficiently obvious that no commanding officer will refuse to use such guns in an action, because they are denominated anti-torpedo guns; if he is able to fire them, he will use them against an enemy. And it seems the part of wisdom if such is the case, to make such guns of at least such a caliber and weight that they will be effective guns on the enemy.

A vote of thanks was tendered to Sir William White for his paper.

The History and Economic Value of Canals

THE second paper read was Commodore J. W. Miller's paper on "The History and Economic Value of Canals, with Special Reference to the Cape Cod Canal.' The character of the paper is justly indicated in the title. Com. Miller told the history of canals from the days of Rameses to the present. From an engineering point of view, the problem of the Cape Cod canal is not great. The total length over the isthmus is eight miles. The total length to 30-ft. depth in both bays is 13 miles. The soil to be cut is sand and amounts to 17,000,000 cu. yds. The deepest cut is 29 ft. above tidewater. The channel at both ends of the route, the natural marshes and streams already furnish a waterway for boats of light draught. The difference in tide between the two bays necessitates no locks. The depth of the canal is to be 25 ft. Minimum width of bottom 100 ft. through the central portion of the canal; this will give a surface width at the narrowest point of 250 ft. The approaches will have a minimum bottom width of 250 ft. The bridges, however, are being constructed on the basis of an ultimate depth of canal of 34 ft.

Discussion of Com. Miller's Paper.

CAPT. THOMAS I. MILLER:—Mr. Chairman, I would like to ask a question or two about a point that I consider important, and that is as to the prevalence of fogs in the upper part of Buzzard's bay as compared with the Nantucket shoals. Additional lighthouses and lightships will be required to make that passage comparatively safe.

COMMODORE J. W. MILLER:—Answering that question, I would say the fogs are very much less dense on Buzzard's bay than they are on the Sound and less than they are at Cape Cod; but notwithstanding that, there is no doubt it is a very foggy region. We are now in communication with one of the electric light companies in this country to lighten that canal every 400 ft., or to make a street of it, because we appreciate this is not only a canal, it is a very narrow strait connecting two important waterways, and the only way we can make it attractive is to make it as clear at night as it is by day, and the success of the canal will depend a great deal upon its operation at night, and the plan those people show today is a plan of lighting exactly as you would light a street on shore.

E. P. STRATTON:—Mr. Chairman, there is one question I would like to ask on the depth of water in this canal, 25 ft., it seems to me that is a depth that hardly meets the requirements of our battleships, and I notice that Capt. Miller has referred to the fact that the bridges over this canal have a foundation extending over 30 ft. over the water; hence I am inclined to believe that it would be desirable if that depth of 25 ft. could be extended. The Panama canal has 40 ft. of water, and as this canal will certainly have to accommodate a large majority of all the traffic passing by sea from Boston to New York and vice versa, I think the promoters of this enterprise should seri-

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ously consider the draught of at least 30 ft.

EDWARD C. BATES:—Mr. Chairman, the writer has referred to De Witt Clinton and Robert Fulton in a general way in this paper. I have heard it stated that Robert Fulton was a designing engineer for De Witt Clinton in the laying out of the Erie canal. I have never come across any such authority myself and I would be very glad if any member here would communicate it if he finds any such authority. Robert Fulton, I believe, died nine years before the canal was opened, but, of course, it was under consideration some twenty years before.

CAPT. J. W. MILLER:—Mr. Chairman, answering the question that has just been brought up, I will say that matter of depth has had very grave consideration on the part of the corporation, of which I have the honor to be vice president. It is a commercial corporation. Twenty-five feet at low water was decided to be all that was necessary for all the commerce of the United States. It will take in every ship that now plies along the coast of the United States. Therefore, from a financial and a commercial point of view, we did not see that we should go any further than we have. We are building, may I say incidentally while other people are attacking and asking for government help, here, there and everywhere, we are building the Atlantic coast canals ourselves with our own money, and we are going to put in anything that is necessary for the merchant marine of the country and this coast. We can scarcely be expected to spend so many millions more for the difference between a 25-ft. canal and a 30-ft. canal for the benefit of the United States government. We are ready to listen to any proposition that the United States government may make, but we are not going to the United States government and asking them for anything.

Needs of the Navy.

If you ask me here, as an ex-officer of the navy, what I think on that subject, I will answer it in a very different way. For eighteen years I have been in the navy, and would say from a naval point of view that is no place for a battleship. The province of a battleship is off shore. These vessels that draw 30 to 40 ft. of water want to keep outside of the land and fight their battles outside. But with that deep insight my chief has, and also seeing that the times may change, we are building all our bridges and everything—with the bridges deep enough and the wharfs far enough back from the side of the canal so that eventually if the government wants 34 ft. of water it can have it.

Notwithstanding what I have said about that not being the proper place for a battleship, I want to lay before you, as a naval officer, this fact. There are four great strategic points, Chesapeake bay, New York harbor, Narragansett bay and Boston. If squadrons in time of war should be in each one of those harbors, and there should come a critical moment when a large fleet should appear off this coast, it might be of the highest importance to unite the fleet in Boston or Chesapeake Bay or in New York harbor, by means of the canal; and the cost today of deepening that canal to 34 ft., which would probably be from one to three millions of dollars, would be nothing to the insuring of a victory by the uniting of those squadrons. I might add that to deepen that canal from 25 to 34 ft. would cost the government absolutely not one single cent provided the survey which is now being made for deepening the shoal around Cape Cod would be extended. The deepening of that shoal will cost the government half a million of dollars, and will not last five years.

Adjournment was then taken for luncheon.

Evolution of Screw Propulsion in the United States

PRESIDENT Taylor called the members to order at 2:30 o'clock. Immediately upon convening, W. D. Forbes read Charles H. Cramp's paper on "The Evolution of Screw Propulsion in the United States." This is a continuation of the paper read at the 1909 meeting and opens with a discussion of the American clipper and larger paddle wheel steamers. The author continues:

As soon as the civil war had begun, shipbuilders began to replace some of the vessels taken by the government and devote their energies to contracts with the government for navy and transport services. The navy department concluded to build a number of armored vessels. Congress made an appropriation and Commodores Smith, Paulding and Davis were appointed a board to carry out the purpose. They advertised for proposals, to be accompanied by full specifications and drawings, and also prices.

The advertisements were responded to by about 30 proposals of the most extraordinary and outlandish character, and three of the great builders from New York proposed to build a ship for a certain sum of money, without a single drawing or scrap of specifications as to dimensions, material or performance accompanying them.

New Ironsides.

The only complete proposition accompanied by drawings with full specifications as to dimensions, and with size of armor, speed and time for completion presented, was that of the New Ironsides, which we furnished, and it was at once accepted, and as the price was less than the appropriation, the board decided to accept the two other propositions, whose sketches and details were fuller than the others. The cost of these ships completed the appropriation. They were those of the Monitor and Galena, and the object of the board, as they stated it to me, in taking them was in the way of an experiment. All of these vessels were propelled by screws.

The contract for the New Ironsides was in the name of Merrick & Sons, who furnished the engines and armor. At that time, engine building was not included in any of the shipbuilding works. The suggestion that we should join in their proposal was made to me by B. H. Bartol, superintendent of Merrick & Sons.

The building of the New Ironsides, Monitor and Galena was an event that led to the effectual and final destruction in this country of the great shipbuilder, whose career and occupation had been so distinguished in connection with the great packet and clipper, and had covered him with so much glory. I refer to the commonplace, but important incident of the battle between the Monitor, with Timby turret, and the Merrimac.

The Monitor was built by parties that were neither ship nor engine builders, and the workmen were very inefficient and the work was done from imperfect sketches. During its construction we were requested to send men over to bend the keel pieces, which were dish-shaped and bent hot, and other matters of difficult workmanship.

This victory over the Merrimac was the cause of one of the greatest excitements in shipping circles that the world has ever witnessed. Ericsson, with all of the officers who were on the Monitor during the fight, became the subjects of the most extravagant demonstration of hero worship. The Monitor craze carried everything before it, and Capt. Fox,

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the able assistant to Secretary Wells, was compelled to order a number of monitors, to the exclusion of everything else, notwithstanding he was not affected by the universal "craze."

The drawings furnished contractors for machinery of Ericsson's own design were mere sketches, and he never could be induced to look at the completed drawing of a contractor nor look at an engine in the course of construction. This was looked on and repeated as an evidence of his greatness. This practice was a cunning resort of his to shift the blame on others if anything wrong happened, or the engine did not function properly; he always claimed that his drawings were not adhered to.

The First Screw Tug, the Sampson.

The New Jersey,* with Ericsson engines and crew, was engaged in towing on the Delaware, and was being repaired at Reaney & Neafie's.

Michael Malloy, who was engaged in towing vessels to a point below the Horse Shoe on the Delaware with old ferry boats, after witnessing the work done by the New Jersey, and with our recommendation, concluded to build one to do her work. We built the Sampson for him, of wood, and Reaney & Neafie built the engines. She proved a success and Mr. Malloy parted with his old ferry boats, and all others in Philadelphia, who followed towing, did the same. The Sampson was the first screw tug boat built in this country, and in connection with Reaney, Neafie & Co., we built a large number for all parts of the United States.

After building the Lehigh, we built the iron hulls of several unimportant vessels, when we joined Neafie & Levy in the construction of a good sized ocean screw steamship, for sale. Thomas Clyde joined in the scheme and secured her when finished at the prices fixed; her name was the Clyde.

After that we concluded to add engine building to our plant, and we secured the services of J. Shields Wilson, referred to in Part I, as the engineering head. The time was very favorable, as the great question of the use and utility of compound engines had begun to agitate the engineering world.

Mr. Wilson, who at that time was the ablest marine engineer in the United States, had interested himself at the very beginning of the agitation, had followed it up and had become so much convinced of its merit that we prevailed on Mr. Thomas Clyde to make a beginning, and he contracted with us to build the George W. Clyde, the first ship built in this country with fore-and-aft compound engines.

*See Part I, Transactions 1909.

The success of the experiment on the George W. Clyde was greater than we expected, and we concluded to build compound engines and not consider any other type in our business as builders of complete steamships.

Pennsylvania, Ohio, Indiana and Illinois.

When a new Philadelphia company was started, in 1871, in connection with the Pennsylvania railroad, to build a line of steamers to Liverpool, Mr. Bartol, on account of his business ability and his experience in steamship matters, particularly in matters relating to engineering, was made a director of the company and chairman of the committee to provide for the new ships.

The building of these four iron ships, between 1873 and 1874, was an event of much importance, particularly as the ships were propelled by screws and the engines were of the John Elder type of compound engines. The ships were subject of much consideration on their arrival in Liverpool, many of the principal shops sending their draughtsmen to look up the flanging in the boiler heads and fire boxes of the boilers; no flanging of these or any other part of a boiler had been done before in Great Britain.

Discussion on Mr. Cramp's Paper.

W. I. BABCOCK:—I think it is somewhat unfortunate that Mr. Cramp has not given any date in his paper. He speaks of a good many old vessels, but it would be much more valuable if he had given absolute dates. He says on page 5 that the Sampson was the first screw tug boat built in this country, and that he built the Sampson, but he does not say in what year.

I have a letter here from one of the members of this society, J. J. Lynn, and he has asked me to read the following:

"It may be of interest to have you mention that it is a question if the Sampson was the first screw tug boat, the Reindeer having preceded her by three years. The Sampson was well known on the lakes, if this is the boat that Mr. Cramp refers to. The machinery was built in Philadelphia, and she was said to have come from the salt water. I would imagine that she was about 125 ft. over all, 19-ft. beam, and 10½-ft. hold. She was a straight low pressure, and in her day was called lazy, principally because she worked condensing and made no fuss as the other tugs did, consequently she was unpopular and her work was confined to towing rafts and barges. At this she was a marked success, because she carried the largest amount of fuel of any of the tugs then in operation.

"The Reindeer was brought here from Lake Ontario by Captain Sim Keeler, who afterwards took her down to the St. John's river, Florida. Her engines were double-cylinder, oscillating, on an incline of 45 degrees, and had an externally-fired boiler, with the boiler set in brick work and the flame passing along the shell, thence through the flues and stack, into the atmosphere. I recently talked to an engineer who was aboard of her when she was in service here, who claims that she was an older boat than the Sampson."

Discussion by Edwin W. Hyde.

EDWARD W. HYDE:—I have a short contribution to this subject, Mr. President. It is a contribution to the early history of screw propulsion. I submit the following: In 1844, there was organized in Bangor, Me., the Bangor Navigation Co., having as its object the building and operating of a steamer between that port and Boston, the following named persons forming the company: Joseph Bryant, Jacob Drunnond, Albert Emerson, E. C. Hyde, James Jenkins and Edward E. Upham. One of the company having been appointed manager, he was sent on a tour of observation down the coast, and after having looked over the steam navigation field of that day and visited several shipyards, he strongly recommended building an iron steamer, propelled by twin screws, as being the most suitable for the service. Acting upon this advice, a contract was made with the firm of Betts, Harlan & Hollingsworth, of Wilmington, Del., for a vessel of the following description:

Length, water line, 125 ft.; breadth, 23 ft. 6 in.; depth of hold, 10 ft.; rig, three-masted, fore and aft schooner with bow-sprit and standing gaffs; machinery, twin screw, consisting of two single engines, 22-in. by 24-in. cylinders; one drop flue boiler; stateroom and berth accommodations for about 150 persons; the keel was of 7/16-in. plate; hull plating, ¼ in. to ⅜ in. thick; frames, flat bar iron, 3 in. by ¾ in., spaced 20 in., to which the plating was secured by U-shaped clips, or keepers, 1 ft. apart, riveted to the plates; the price of the hull, based on a weight of 94,447 lbs. at 9¼ cents per pound, was $9,208.58; price of machinery, $7,650.00.

Separate contracts were made for carpenter and joiner work, rigging, painting, etc. The total cost of the vessel, ready for sea, was about $21,000.00, an itemized bill for which, submitted by the builders, is in the possession of the writer.

The propellers were 8½ ft. diameter

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of the Loper type, for the use of which the patentee was paid a royalty of $330.00. The increased cost of living seems not to have obtained in the matter of propeller wheels since 1845.

The vessel was about seven months in building, was named the Bangor, and at a builder's trial on the Delaware, July 25, 1845, showed a mean speed of 11.56 miles per hour, with steam pressure of 46 lbs.

She then went on the route between Boston and Bangor, and on her second trip, when entering the Penobscot river, fire was discovered in the cargo, which spread rapidly to the woodwork of the vessel, which was entirely destroyed. She was beached as soon as possible after discovery of the fire and no loss of life occurred. The finances of the company did not survive the wreck, and the boat was floated and rebuilt by other parties and taken south, where, under the name of "Scourge," she was used by the government as a transport in the Mexican war. At the close of the war she was sold in New Orleans, after which time all record of her seems to have been lost.

E. P. STRATTON:—Mr. President, I think there is an error in the statement that Mr. John Roach was a boilermaker; he was not a boilermaker, he was a founder of world renowned fame.

Discussion by W. Conant Church.

W. CONANT CHURCH (communicated):—In Mr. Cramp's excellent paper I find him saying: "This victory over the Merrimac, coming as it did while the whole country was aroused over the sinking of the Congress and Cumberland, was the cause of one of the greatest excitements in shipping circles that the world has ever witnessed. Ericsson, with all of the officers who were on the Monitor during the fight became the subjects of the most extravagent demonstration of hero worship. The Monitor craze carried everything before it, and Capt. Fox, the able assistant to Secretary Wells, was compelled to order a number of monitors, to the exclusion of everything else, notwithstanding he was not affected by the universal 'craze.'" Mr. Cramp further says:

"The drawings furnished contractors for machinery of Ericsson's own design were mere sketches, and he never could be induced to look at the completed drawing of a contractor nor look at an engine in the course of construction. This was looked on and repeated as an evidence of his greatness. This practice was a cunning resort of his to shift the blame on others if anything wrong happened, or the engine did not function properly; he always claimed that his drawings were not adhered to."

Mr. Cramp in Error.

As to these statements, Mr. Cramp has fallen into error, doubtless because of imperfect information. I found among the papers of the late John Ericsson, to which I fell heir, letters from Gustavus V. Fox, extracts from which will enlighten Mr. Cramp on the subject. June 18, 1862, Mr. Fox wrote a private letter to Ericsson, saying: "The secretary has today decided to let you build two vessels of the big class—one of one turret and one of two turrets. I am sorry it is not four, but if no new plans are presented within a few months, it may be considered by him desirable to build two more. The official letter will go to you at once for two."

Writing to Ericsson, Aug. 5, 1862, Mr. Fox says of the monitors: "Nothing that has been presented approaches them in value. The Galena and Ironsides are the work of the blacksmith; the Monitor a piece of delicate, perfect mechanism. Your associates have nearly five millions worth of work, and the public, whom we serve, expect other work to be scattered. For yourself, with your patriotic impulses, the establishment of your system must be your greatest reward. People incapable of making one of your ships are begging, beseeching, and demanding one. We propose to advertise, say for a class of vessels like the big monitor, Quintard's vessels, and the new monitors, to be built on the Atlantic or Western waters. Will you help us by furnishing drawings, etc.?"

Excerpts From Fox's Letters.

Writing four years later, April 23, 1866, Mr. Fox said to Ericsson: "The country never can and never will do you justice pecuniarily for the inventions which have been so useful, and which have realized the creations of imagination, and which are the results of genius in comparison with other systems which are born of labor and art and long study. Your reward cannot be counted in gold and silver, or income; it is immortality and your own happiness at success. Nevertheless, you will, I trust most sincerely, have all you desire here in this life. I need not assure you how confidently I believe that the raft principle will prevail for iron-clads, and I should like to see it tried for passenger steamers. The victory has come to you at last through the trials all must go through."

The confidence Ericsson had inspired at the department, among those who were not influenced by professional prejudice, is shown by a letter of June 9, 1862, from Mr. Stimers, who said: "You will not be interfered with in your arrangements. The secretary and Mr. Fox have the greatest confidence in your skill and uprightness."

Writing to congress concerning a memorial presented by Ericsson, Secretary Welles said: "The memorialist has been a public benefactor, and in the fullness of his patriotic zeal has freely given to his country the productions of his genius and the labors of a remarkable mind. In doing this, and in undertaking to furnish the government with vessels that would give it maritime supremacy, he does not appear to have been influenced by pecuniary motives. His work has been well done, and is worthy of the government and his country."

Ericsson's Attitude Toward Critics.

I am sure that Mr. Cramp will be glad to accept the evidence these extracts from letters by Mr. Fox and others afford that he has fallen into error in the statements from his paper quoted above. That Mr. Fox's faith in the Monitor underwent no change is shown by a letter written by him in 1869, in which he said: "Navy officers in our service and the English will advocate a broadside system—such was the English report—or at least connecting the turrets by casemates, and such would have been a report of our own had we put the monitor system into their hands. It arises from education in broadside ships and the instinctive appreciation that their own position will be shaken if fighting ships are reduced to machines, the product of engineering skill. Porter is desirous of having the satisfaction of building up a navy founded upon his own ideas and English precedents. He will not follow in the wake of those who preceded him, but throwing all experience overboard, even his own endorsements, he assigns to the Monitor shore duty and tonnage of 800 tons and to his invulnerable sea steamer only 3,300 tons. He will learn that invulnerability cannot be reached in the latter tonnage by any other type than the monitor."

Ericsson's Mechanical Drawings.

Ericsson's attitude toward his critics is shown by a letter written ten years after the civil war, in which he said: "In reply to your kind letter, asking for a copy of acknowledgements received complimentary to what you are pleased to call my great work, I beg to state that nothing could induce me to lay before the world the approving opinions of the monitor system without also presenting the adverse criticisms of my work, which learned, as well as skillful, practicall men have written in great numbers."

Mr. Cramp's statement concerning the incompleteness of Ericsson's drawings of

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his designs is very contrary to the impression I derived from an examination of the vast mass of mechanical drawings turned over to me by Ericsson's executors after his death. Certainly, when in his youth, he was a draughtsman in the employ of the Swedish government, he was so skilled that he was entered upon the pay rolls under two names and drew two salaries. I think Mr. Cramp should furnish some evidence in support of his statement that Ericsson's "practice was a cunning resort," etc. This may accord with the opinion of Ericsson entertained by jealous rivals, but it is entirely out of keeping with the character of the man as he was. As to this without occupying too much time with a matter aside, I can only interpose a positive denial of the correctness of the statement quoted; a denial based upon an acquaintance with the professional and personal correspondence of John Ericsson extending over most of his lifetime. In this I find no suggestion by way of complaint or otherwise in support of Mr. Cramp's criticism.

As to the "Monitor, with the Timby turret," the only resemblance of the Timby turret to the Monitor was in the fact that Timby and Ericsson, in seeking to provide an all round fire, both adopted a device as old as the days of Greek and Roman warfare. A Monitor with a Timby turret would have been an impossibility. It is absurd to charge the author of a hundred patented inventions, and the designer of a vessel requiring some forty devices so novel that they were also patentable, with depending for his fame upon the device of a single chance inventor. The Timby turret has never been used anywhere, while the device of a vessel bearing a Monitor turret has revolutionized the navies of the world. After going through a cycle of change, such as Capt. Fox predicted, naval designers now show a tendency to return to the simplicity of the original Monitor. Had they adhered to it, with modifications required to meet the changes in guns and powders, what an enormous amount of public money might have been saved.

Discussion by H. Penton.

H. PENTON (communicated):—I think it is a matter for regret that the author's remarks on pages 3 and 4 of this paper with reference to Ericsson should become a part of the records of this society. I have in my possession copies of some of the original sketches submitted by Capt. Ericsson to the navy department, together with some of the accompanying correspondence, and it seems clear that not only is Mr. Cramp in error, but also that all the credit which has hitherto been so freely accorded Ericsson not only in the United States, but also in Europe, was his by right, and that we should not, because of the rapid contemporary evolution, countenance reflection upon his memory.

It may be true that the Monitor was built by parties who were not experts in shipbuilding; it will be remembered that experts in iron shipbuilding were not numerous anywhere at that time, nevertheless, they undertook something which those who passed as experts shrank from, and the results are now matters of history. Details of construction are still matters of controversy, as the Transactions of this society bear witness.

As to the adulation which followed, we are not guiltless of it even in these latter days when we have had no great national crisis confronting us. The members of the society who attended the summer meeting at Detroit last year had an opportunity of judging in the Don Juan de Austria of the freedom with which praise or criticism is bestowed. As to iron shipbuilding, it may be repeated that the Monitor was antedated even on fresh water by over 20 years, and there are still running on the great lakes, screw ships with compound engines that antedate by many years the American Line ships referred to, and it may be interesting to note in this connection that some of these ships, built as long ago as 1862, still retain their original boilers.

Mr. Cramp is very much in error in his statement that the Sampson was the first screw tug built in this country, if, as may be inferred, she followed, or was contemporary with, the Monitor. Of course, there were numerous screw propeller ships in service in the forties and fifties, but I understand Mr. Cramp makes a distinction between these and tug boats.

B. H. Bartol in *A Treatise on Marine Boilers of the United States* (Philadelphia, 1851) refers to the tug boat Rescue, built for New York harbor service and engined by Reaney & Neafie. He gives her dimensions as: Length, 106 ft. 6 in.; beam, 20 ft.; depth of hold, 9 ft.; tonnage, 173 (presumably gross). She was fitted with a double vertical inverted simple engine with cylinders 26 x 26 in., driving a four-bladed propeller 8 ft. 2 in. diameter, 18-ft. 6-in. pitch, with a developed blade area of 56 sq. ft. The average revolutions are stated to have been 56 per minute with steam at 35 lbs. and cut off at 11½ in.

Accurate records of early steam vessels are somewhat difficult to obtain, but the oldest list I have at hand shows that the screw tug Witch of the West was built on the great lakes in 1856 and the L. L. Lyon in 1857. There were doubtless many others, even earlier, of which records are not now available.

THE CHAIRMAN:—Is there any further discussion upon this paper? I think there are one or two other errors in the paper, which I have not read until this moment. "The Monitor was built by parties that were neither ship nor engine builders." Thomas Rowland, who built the Monitor, was originally an engine builder. I know he was concerned in a shipyard that built the City of Boston and City of New York; so I think, as a single statement, that this is an error that can be easily verified and corrected, if necessary. I will see that that is done.

Floating Dry Docks in the United States

THE next paper read was W. T. Donnelly's paper on "Floating Dry Docks in the United States; Relative Value of Wood and Steel for Their Construction." There are 91 floating dry docks in the United States, of which three are of steel and one with steel wings. The only steel commercial floating dry dock is that of the Great Lakes Engineering Works, at Ecorse. After comparing a steel floating dock of 20,000 tons lifting capacity, which he designed, but which was never built, with similar docks with wooden pontoons, the author concludes as follows:

"All the writer's experience with floating dry docks and their construction and repair, leads to the firm conclusion that for underwater work, such as pontoons for the Rennie type of dock, wood is a much superior material of construction to steel, that the original cost is much less, the cost of maintenance less, and the life of the structure greater than steel. For the wings and upper work experience is equally conclusive for the use of steel. While it is apparent that the cost of maintenance will be considerable the structure will last much longer and with a sectional pontoon dock, where the wings are accessible at any

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time, and any portion of the wings may be entirely replaced if necessary, it would seem that the structure as a whole will last indefinitely.

"A comparison of the materials used for wooden and steel pontoons shows that the weight of the steel per hundred tons of lifting power is 33 tons and the the weight of wood per hundred tons of lifting power is 36 tons. It is evident that the difference in weight must be supplied by increased dimensions of the wooden pontoons. Other than in this particular wood appears to have the advantage in every way."

Discussion on Mr. Donnelly's Paper.

PROF. CECIL H. PEABODY:—I think it would be better to let this pass as if there were no discussion, because we can make no objection to the information given us.

HORACE H. THAYER JR.:—If it is in order, I would like to ask Mr. Donnelly what his idea is in regard to a composite pontoon.

WILLIAM T. DONNELLY:—I would like to state that that matter has received considerable attention at times by myself. I have always found there was a very great difficulty in making the contact between the steel and wood. If we limit the amount of steel in direct proportion to its strength, we find that the bearing on the wood will not be sufficient; the pressure brought to bear would crush the wood. Another thing, in the contact of wood and steel—the steel in such cases suffers a very great deal, there seems to be an increased rusting between the steel and the wood. In the matter of contact in steel pontoons, it was taken up carefully, and taking the experience of the John H. Robins Co., it was considered as a serious problem, the contact of the wood and the steel, that the corrosion would not be too rapid; we added to the plate of the steel a plate to provide for the possible contact, and then eliminating the contact as far as possible. Then we found even that there was an unwarranted amount of corrosion and deterioration of the steel. I am aware that there have been quite a number of composite pontoons built of this kind, but I am not aware of them practically, and I would be glad to have anyone give his experience in that respect.

A. C. CUNNINGHAM (communicated):—In the combination of wooden sectional-pontoons with steel side walls, Mr. Donnelly has secured a floating dry dock of comparatively low first cost, and moderate costs for maintenance and repairs. These are essential features in a commercial dock which, to be a success, must give a good return on the investment. A commercial dock must be out of commission as little as possible, and Mr. Donnelly's combination also tends to this condition. To prevent serious deterioration, a dock with steel pontoons must be self-docked at reasonable intervals for cleaning and painting. With wooden pontoons, these intervals can be much longer, as there is no rusting to contend with, and by keeping the wooden pontoons wet, the rotting of the wood can be prevented. The steel side walls can always be preserved in place without disabling the dock.

Permits of Greater Capacity.

The combination also permits of a dock of much greater capacity than in wood alone. The pontoons become merely beams for transmitting the weight to the side walls, and when of steel, these can be designed and constructed to take any stress safely. There would probably be found a point where steel pontoons would be more economical than wood in first cost, but it would be considerably beyond the capacity of a purely wooden dock.

If a dock with wooden pontoons were located in water where the teredo is plentiful and active, some attention would have to be given to the protection of the wood from the inside of the pontoon, especially if there were periods when the dock was inactive. The new graving dock at the Norfolk navy yard was flooded for several months before the caisson could be placed and the dock pumped out; the oak keel blocks had been placed in the dock by the original contractor, and when the dock was pumped out, it was found that the teredo had cut into the blocks about 1 in. The greatest danger for the wooden pontoon would be at the bottom, where there is always water, and this would also be the hardest place to inspect.

Mr. Donnelly's link and wedge-pin connection between pontoons and side walls is extremely simple, rapid and effective. If made from steel, they are presumably forged from the solid and have no weak point. By making them of soft steel and finally quenching in oil from a dark cherry red, a metal with a high elastic limit and great toughness at the same time would be produced.

The preservation of the outside and inside of an all steel floating dock, or of one with steel side walls only, is a matter of importance, and with a commercial dock, a question of economy as well. The government, in this country, at least, has had the most experience in this matter. With the New Orleans dock in fresh water, and the Pensacola dock in salt water, the Cunningham coal tar paint has been found to be the most enduring, as well as the least expensive preservative that could be applied to the outside. Red lead has not proved satisfactory on the inside of these docks and the coal tar paint is now being tried. The fumes from this paint are severe on the painters' eyes in a closed space, but this difficulty can be overcome by equipping the painter with a diver's or a fireman's smoke helmet.

Use of Caisson Proposed.

Were it not for the impossibility of preserving and repairing the bottom, there are many who would prefer the solid dock to any self-docking type. In an effort to meet this case, the writer has proposed the use of a caisson. The general proposition is not new and to this class appliances, Lyonel Clark, the English floating dry dock expert, has given the appropriate name of "limpet." The new feature in this caisson is the supplemental chamber, having a circular cross-section. The supplemental chamber gives increased control over the "limpet" in sinking, the buoyancy of the combination can be first destroyed, thereby giving easy handling under water. The most important function of the supplemental chamber, however, is the insuring of a perfect seal against the bottom of the dock before the main chamber is pumped out.

When the revival in American shipping comes, the floating dry dock will immediately take a place of prominence.

MR. DONNELLY:—I might add one word in reply, and in relation to the teredo and the caisson dry dock. Of course, you know that that dry dock was exposed to light. Of course, you will understand that if dry docks are entirely closed and there is no light admitted, it is somewhat different; and I have been very careful to see whether there was any attack by those insects on those docks, and I have been unable to find them where they have been practically sealed up and no light get through, and I think it is safe to say that in a closed structure, where no light is admitted, no such life as the teredo will exist.

The Floating Dock at Ecorse.

H. PENTON (communicated): — With regard to the question of maintenance of all iron or steel floating docks, I might say that when the floating dock of the Great Lakes Engineering Works, Detroit, referred to on page 4, was under consideration, the writer being at that time identified with that concern, the question of type and material was long and earnestly debated, the more so because we had less concern as to corrosion and maintenance than obtains in coast practice. In reaching a conclusion, the longevity of the U. S. S. Wolverine, referred to in the Transactions for 1909, had a prominent part.

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We also had before us the case of an iron floating dock in Spain, dating from, I believe, 1858 and still in apparent good condition, though not of the self-docking type. The question, therefore, resolved itself into one of almost negligible maintenance as to steel on the one hand as contrasted with comparatively short life and continually advancing prices of wood, as used in dock construction, on the other. The question of excavation was largely eliminated because of the side launching method prevailing on the lakes, and with which the members are familiar, enabling the use of the same slip for both dry dock and launching berths. In fact, it is a common practice to launch even the largest ships, up to 600 ft. in length and 60-ft. beam, sidewise into the ordinary basin dock having a top width of about 100 ft.

At that time, 1902, there were on the lakes only four ships of 500 ft. in length and the tendency seemed to be towards a somewhat shorter ship and we, therefore, decided that a length of 450 ft. was all that we were warranted in providing for, and we accordingly fixed upon the sectional self-docking type consisting of three sections, approximately 150 ft. in length each, to which a fourth section was added later. In fact, before the three sections as originally planned were built, we ourselves were building ships of considerably over 500 ft. length.

Still later, to provide extra flexibility, two other shorter sections were built. The Ecorse dock is, therefore, so far as my information goes, the largest floating dock in the world in respect of linear dimensions, though not as to lifting capacity. The latter is not an important requirement in mercantile work because underwriters' restrictions prohibit docking a loaded vessel, except at owner's risk. So far as relative endurance of wood and steel is concerned, at least in fresh water, the life of a steel or iron dock is entirely unknown, while that of a wooden basin or floating dock is fairly well established.

HORACE H. THAYER JR.:—Mr. Donnelly has asked for information upon composite docks. I do not know any detailed information except on one dock that I designed for the government of Venezuela about five years ago; that cost fifty-five dollars per ton of lifting power, but it would not have cost as much as that if it had been erected in the United States.

William W. Bates' paper on the subject of "Our Constitutional Shipping Policy and the Compact for Its Establishment" was then read by title, after which adjournment was taken for the day.

The Second Day's Sessions

The Program Includes a Number of Papers of Great Interest and Importance

FRIDAY'S morning session convened at 10:30 o'clock, being delayed somewhat by a meeting of the council. President Taylor occupied the chair. The first paper read was entitled "An Analysis of Tests of Watertight Bulkheads with Practical Rules and Tables for Their Construction," by Prof. William Hovgaard. This paper is a continuation of last year's paper on the "Strength of Watertight Bulkheads." While that paper was of a purely theoretical nature, the present paper contains an analysis of bulkhead tests followed by practical rules and tables based on this analysis. All the tests, except two, were carried out in American battleships and cruisers.

Discussion on Prof. Hovgaard's Paper.

PROF. CECIL H. PEABODY:—I have some brief remarks to make, and I was rather hoping that some other members of the society would discuss the work of my colleague. I would like to say some complimentary things that perhaps I could say more agreeably if he were not my colleague, but perhaps you will accept those as having been said in congratulation of the importance and value of the work that has been done.

I want to speak on one item, on page 9, and make a remark and ask a question in regard to it; it is near the middle of the page, where Prof. Hovgaard says: "In practically all cases the observed curve of deflection of double stiffeners, tests Nos. 1 to 6, corresponded fairly with the curve calculated under the assumption that the stiffeners were freely supported at the apices of the brackets, and this in spite of the fact that the brackets fitted both at the top and the bottom of the stiffeners, were very substantial." I wish to ask whether, in Prof. Hovgaard's opinion, it is the difficulty of piecing members to the end, or whether it may be due to the fact that stiffeners are put on both sides of the plates, the connection to the neutral axis is not properly sustained, and there may be longitudinal sloping, this may produce the same result as the lack of stiffeners at the end.

There is another item I would like to speak of—not in the light of criticism—but as to the undesirability of using the word "stiffeners" at all, because that looks as if a bulkhead ought to exclude water, but is not quite up to its business. Now, Prof. Hovgaard has shown very completely that the bulkhead is not to be considered in that way at all, but in a certain sense, the stiffeners and the bulkhead are built to exclude water, and if you use the word "stiffeners," which is the old term, it might lead to some of the disastrous results we have had in the past. I know that to change a name that has been in common use may be impossible, or at all events undesirable, but one is led to surmise sometimes that danger and the loss of life has been the result of the use of wrong words, and the fact of the wrong word having been used, there is a wrong remedy applied, and then there may come disaster. Perhaps I am overestimating the importance of this.

Coaling Warships.

Spencer Miller then read his paper, "Coaling Warships—Notes of Progress." Before proceeding to read the paper, he said:

It would be quite natural for a paper covering the subject "Coaling Warships," to have something to say on the subject of coaling warships in a sea-way, but I have not touched on that view of the question in this paper. In point of fact, if I did touch upon it, I would have to acknowledge that the European navies had far outstripped us on that question; but although the apparatus that solved the problem of coaling at sea was primarily American, today the foreigners have found a machine that has already transferred in a heavy sea 66 tons per hour for a period of eight hours; and that is the record for ships in a sea-way. In the subject matter of my paper, which is the matter of discharging coal from colliers in a smooth sea or in the harbor, we are distinctly in advance of Europe, although whether or not we can hold this position is another matter.

Mr. Miller's paper was devoted to a description of the coal handling gear on the naval colliers Vestal, Prometheus, Mars, Vulcan, Hector, Neptune and Cyclops. All of these colliers, excepting the Cyclops, carry a novel form of coal discharging gear, known as the marine transfer. The Cyclops discharges its coal by self-filling buckets, but with a different system of rope leads. These colliers have been thoroughly described in THE MARINE REVIEW (September and November, 1909). A. L. White said that he had been present at the discharge

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of the Cyclops, reporting that one of the buckets discharged four tons a minute and that each of the buckets in 12 hours discharged something like 2,800 tons.

The Gyroscope for Marine Purposes.

Elmer A. Sperry's paper on "The Gyroscope for Marine Purposes" was then taken up. This paper was novel and of great interest, and will be published in full in the Ship Building Edition of THE MARINE REVIEW, which comes out in January. Before reading his paper, Mr. Sperry said:

This subject of the application of the gyroscope to marine purposes has been a subject that has interested me for some fifteen years, and last year, while abroad, I made it a point to see every one who could be found conveniently, who had written on the subject of the gyroscope or who had touched upon its application in any way; and I assure you I met a very interesting group of men, the master of whom is our good friend, Dr. Schlick. Although our rules would not allow me to publish his portrait, which was given to me by Sir William H. White, still I have a slide in which we will see his genial face, before we are through. I found quite a number of people in Germany, who were interested in the gyroscope, but usually in a very theoretical way. Few seemed to have any idea of its practicability, outside of Dr. Schlick, and possibly Brennan in England, and one or two others. Our own Leavitt, in this country, has perhaps made the greatest success with the gyroscope. Sir William White gave me some very interesting records that he had in reference to bilge keels, with which the last paragraph on the first page of the paper deals, to some extent.

I might say one word as to how Dr. Schlick happened to approach this subject. He had, for a number of years, noticed a peculiar action of side-wheel steamers. As a side-wheel steamer rolls, her nose goes round in the direction in which the roll takes place. He thought about that a great deal and of what utilization could be made of it, and it led to his work of installing his sea bar, which we will see in the views. When he read his paper in Manchester, quite a number of Englishmen jumped up and said there was no such thing as he said he had seen, that the nose of a side-wheel steamer turned in the direction in which her roll took place, and that every ship rolled; and the testimony was so strong against Dr. Schlick that he could only get up and say: "Well, I saw it;" and he did see it, and the motion he observed was absolutely different from that motion known as yawing. When a ship yaws, it goes in an opposite direction, but when it has this gyroscopic motion, it goes off in the same direction.

After reading his paper, Mr. Sperry illustrated it with a number of stereopticon views and further exhibited its powers by means of a model gyroscope, which attracted great interest, the chairman speaking of its control of motion as something uncanny almost. Adjournment was then taken for luncheon.

Comparative Results in Steam and Coal Consumption on Yacht Vanadis

UPON convening on Friday afternoon, Clinton H. Crane's paper on the subject "Comparative Results in Steam and Coal Consumption with Turbines, Reciprocating Engines and a Combination of the Two on the Steam Yacht Vanadis," was read by the author. This yacht, designed by Mr. Crane, was built on the Clyde, in 1908. The propelling machinery consisted of the usual arrangement of Parsons turbines with a high-pressure center and two low pressures driving the wing screws. The guaranteed speed of the vessel was 15½ knots maximum, with a cruising speed of 13 knots, which was to be obtained on a guaranteed consumption of 26 tons of coal per 24 hours. On trial before delivery, this guaranteed speed was exceeded by about one knot, and a twelve-hour coal test was run at 13 knots when 13½ tons were supposed to have been burned. Special stress was laid on the question of economy at cruising speeds and the turbines were designed primarily with this end in view. The owner reported, however, that the yacht was consuming more coal than the guaranteed amount, so much so as to make her cruising radius inconveniently short. A series of tests were, therefore, decided upon, and the best test showed a consumption of 33 tons, or 27 per cent more than the guarantee. It was decided to remove the center high-pressure turbine and replace by a reciprocating engine, exhausting into the two low pressure turbines. Under the new arrangement, the yacht consumes 23.47 tons of coal per 24 hours. The summary of coal and water tests is incorporated herewith.

Discussion on Mr. Crane's Paper.

H. B. ANDERSON:—The author states that special stress was laid on the question of economy on cruising speed, and on a twelve-hour run at 13 knots, 13½ tons was supposed to be burned. Such a statement is a little contradictory, and I should like Mr. Crane to let us know exactly what was the method used to determine the quantity of coal burned, and by whom it was weighed and measured. After the boat had been in commission a few months, we were requested to make an inspection, as it was reported that the ship was burning a very great quantity of coal, far more than the guarantees, and I was on board at three of the tests, on the last of

Summary Coal and Water Tests.

Type machinery.	Date.	Mean draught.	Displacement, tons.	R. P. M.	Speed.	Coal, tons per 24 hours.	Water, pounds per hour, propelling machinery only.	Water, pounds per hour, all purposes.	Water, pounds per hour, propelling machinery only, reduced to 13 knots.	Water, lbs. per hour, all purposes, reduced to 13 knots.	Coal, tons, reduced to 13 knots.	I. H. P. for 13 knots.
Three turbines.....	Oct. 5-6, 1908.....	12 ft. 9 in.	1,506	451.3	12.968	33.92	.....	.....	.....	.....	34.0	.....
Three turbines.....	Oct. 14-15, 1908.....	12 ft. 2 in.	1,416	454.2	13.022	33.00	23,962	29,188	23,700	28,926	32.9	.....
Engine only.....	May 20, 1910.....	12 ft. 6 in.	1,467	152.4	12.968	.....	19,000	23,000	19,152	23,152	25.0	1,135
Combination engine and two turbines	July 13, 1910.....	12 ft. 4 in.	1,442	141.2 452.0	13.3	.....	18,400	22,960	17,700	22,260	....	.....
Engine and two turbines...	July 14-15, 1910.....	12 ft. 2½ in.	1,422	140.9 452.5	13.3	23.47	.....	.....	.....	.....	22.7	.....

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which we reduced the consumption to about 33 tons for the 24 hours. Now, this amount of coal seems to be excessively high when it is compared with the Clyde trial, but I think it should be borne in mind that the conditions out here are entirely different from those on the Clyde trial. First of all, we were burning ordinary American coal against Welsh, which, of course, is not anything like so good. Then secondly, the 24-hour trial out here is infinitely more severe than a 12-hour trial with Welsh coal. On a 12-hour trial, you would not have to clean out the fires at all, while here we do. Then the builders' men probably knew how to get better results from the boilers than the ordinary stokers did, and we did not interfere with the stokers' arrangement at all, but left that to the men.

Then also I think the whole turbine efficiency could have been very much improved by cutting down the propellers and speeding up the turbines; in other words, making the turbines more economical at 13 knots, because the boat was designed at a guaranteed speed of a little over 15 knots, and on trial it came out at 16. I think I could have effected a saving of about 12 per cent, which would have brought the coal consumption round to about 30 tons for 24 hours.

I think Mr. Crane is to be congratulated on the success of the reciprocating installation, but at the same time that result has been obtained at a sacrifice, which is speed, but at the same time saving in coal consumption and greater cruising results.

I would like you now to turn to the curves, and will just say this; on plate 1, curve 1 shows the speed of the reciprocating engines without any propellers on the wing shafts, and on that trial the boat made a maximum speed of about 14 knots. The curves 2 and 3 show the combination at work at which the best speed was about 13.7. Curve 4 shows the straight turbine; I think that curve should be extended right up to 16 knots, and the other two curves stopped at 13 knots for curve 1 and 13.7 for curve 2. This will show what the turbines did at increased speed, and which it is not possible to get out of the combination.

Our Old Friend, the Indicator.

COL. STEVENS:—May I ask, Mr. Chairman, in view of Mr. Crane's reflection on our old friend, the indicator, how he would act where I have found myself running under very small differences of wind, and where small differences would have effect on each run; what has he to say on the question of whether a mean effective pressure is not derived from the speed of revolution?

THE CHAIRMAN:—Does any other gentleman desire to add to this discussion?

ADMIRAL H. I. CONE:—May I ask that Mr. Crane will throw a little more light on the subject as to whether the ship in these tests was run at all in combination, at a greatly reduced power, with a view to get the effect of the exhaust reciprocating engine at one-tenth of the power.

MR. CRANE:—We never ran at more than ten knots.

ADMIRAL CONE:—I ask this question because these are problems we are up against every day; I mean as to the effect when you reduce the power greatly, as we have to do under peculiar conditions—in other words, what effect the introduction of a small amount of steam into a reciprocating engine would have on the turbine when it got to the turbine?

MR. CRANE:—I think I can answer that when I come to the general answer.

Measuring the Coal.

E. P. PLATT:—I simply wish to refer to the question of the trials on this boat, without any regard to the turbines or the reciprocating engine, but mainly in regard to the boilers and the question of coal consumption. It is evident from what is said in the paragraph here in regard to economy, that in writing this paper and in trials on this side, the whole question was a question of economy in contrast with the speed in knots. Mr. Crane makes out that that was made a great point of, when the boat was being designed. Then when it comes to the question of the trial, which was carried out in Scotland at 13 knots, strangely enough, the test was only conducted for 12 hours and not 24 hours, when 13½ tons were burned. I would ask him in regard to the method adopted in measuring the coal on that trial. It seems to me from what I have seen of boats designed in England, particularly yachts and the trials that have been made there, that it is generally understood and expected that those trial trips will be made, as they are always made, with picked Welsh coal, and that the results obtained then will be practically trial results obtained with good picked coal. Is it not to be expected that with boilers run in that condition a very different result will be obtained than those obtained in this country with ordinary coal such as is sold in New York—not with the ordinary, good steam coal, but with the ordinary stuff bought and put on the wharf for these boats. I think perhaps some of the men here can tell us with regard to some trials that have been made on other boats in which a very considerable difference has taken place between trial tests of the boat run with ordinary coal bought economically over here and with high-class coal.

H. F. BATES:—As a matter of record, I would like to call Mr. Crane's attention to the air pump on the high pressure engine, one air pump in operation at a time. I thought it might be well to mention that.

Mr. Crane's Reply.

CLINTON H. CRANE:—I will answer this discussion, Mr. Chairman. I had hoped that some of the gentlemen who were present at these tests would express some opinion as to the care and accuracy with which they were performed. I know there are some others present who were also present at the tests.

The question which Mr. Anderson has brought up is a question which I do not feel very much like replying to in this society. It trenches a little more closely on the sort of disagreeable discussion which we had last year. I presented this paper as a comparative set of trials of the machinery of the vessel in three different conditions. The tests were carried on as nearly as possible in the same way.

In regard to the question of bad coal, our evaporation per pound of coal works out a little better than 9½ lbs. Now, members of this society may have had much better results with steam coal, even with picked steam coal; I for one have not. I find more tests where the evaporation runs at 8 lbs. than I do at 9½ lbs. To show in different runs what the difference in coal would mean would be assuming that our boilers gave us nearly 12 lbs. steam per pound of coal, not from and at, but actually from a pound of combustible irrespective of ashes, and I do not think it is fair to expect such a result. So far as the speed is concerned, there is no question that in making this speed we made a sacrifice of from 1½ to 2 knots of our maximum speed. Whether this could have been avoided is not the question. I think anyone who will look at the sizes of the propellers, the relative pitches, will see that it was perfectly impossible to run at a very much higher speed without overspeeding our center engine, and still have it running correctly for our 13 knots. We made a trial of allowing live steam to go directly into our low-pressure turbines, and got very close to 15 knots, but it was not a feasible working arrangement excepting for a stunt.

Tests at Reduced Speed.

So far as economy on very much reduced speed is concerned, I have a record of comparative tests at 10 and at 13 knots. These were run last winter, when the boat was finished, not with the present propellers, but the two tests

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run in the same condition. If it would be of interest and would not cumber the transactions too much, I will be very glad to include the data of those tests. Apparently, the turbines are doing less and less work as you reduce the pressure on the center engine. You can notice that if you will look at the slip curve on plate 1. You will notice that at 10 knots the turbines are showing 10 per cent. If, however, you will look at the speed revolution curves 1 and 2, just above, No. 1 being for the boat driven by the center engine only, No. 2 the revolutions of the center engine when working in combination, you will see that even at these reduced slips the turbines are still helping, and if they did no more than turn around without resistance, they still would be of advantage at the regular cruising speed. In this 10-knot condition, there was about 10½ to 11 in. vacuum in the turbine receiver.

In regard to what Mr. Stephens said about the indicator card, the procedure was to take three sets of cards on each run, to figure the cards on the basis of the mean revolutions of the run, plot the individual spots and carry the curve through those spots. Undoubtedly, in the lower speed runs, the low-pressure card is not telling all the truth. I think anyone familiar with indicators will know how difficult it is to touch even lightly on a low-pressure card and not have it interfere with the action of the indicator.

Perhaps it would not be amiss to have me say that our experiences with the vessel in the three conditions has been that in general cruising with adverse weather, our speed fell off very much more with the turbine than it has since we have had a large propeller to help us out.

The comparisons in this regard were all run in summer weather conditions, smooth sea and clean bottom. In actual service the economy in coal is very much greater than is shown by these results.

John F. Metten's paper on the subject "New Propelling Machinery of the S. S. Creole" was, at the author's request, deferred for one year.

Some Suggestions for Reducing the Loss by Fire on Vessels

VICE President McFarland took the chair while Samuel D. McComb's paper on "Some Suggestions for Reducing the Loss by Fire on Vessels" was being read. This paper is an extremely valuable one.

Three Classes of Fire Hazard.

It is abstracted as follows:

From the standpoint of fire hazard, vessels can be divided into three general classes, viz.: Steam, gasoline and those without power. On steam vessels the principal ascertained causes of fire are woodwork around up-take or stack igniting, spontaneous combustion of coal, fire originating in the cargo and from galley stoves, lamps and candles. It is of the utmost importance where a stack passes through a wood deck that the opening be cut at least 12 in. clear all around and the wood be faced with asbestos and sheet iron or steel. If forced draft is used and overheats the up-take and stack further protection is needed—either the up-take and the base of the stack should be covered with cement or all the woodwork within a distance of 3 ft. should be covered with sheet iron over asbestos. When covering a boiler care should be taken along the sides of it; frequently the space betwen the boiler shell and bunkers is so small that it is difficult to make a good job, but in no case should this space be packed up with non-conducting material. Some opening should always be left between the covering and the bunkers. On a leg boiler the covering on the sides of the fire-box should be carried right down to the floor. A coaming should be placed at the front of boilers extending across the fire-room to prevent hot ashes getting between boiler and bunker sides. The same care that is used in protecting woodwork around the boilers should be used around the galley stove and stove pipes. Most important of all it is to have a metal hood over the stove or have the ceiling overhead covered with asbestos. In engine rooms the method of carrying lubricating oils and waste needs attention. It is well to have the supply of oil as small as possible. All oil cans should be carried in metal trays to catch the drip and all wooden shelves on which oil is kept should be completely covered with metal, having the edge turned up and all joints soldered. No oil should be kept in partially filled barrels; when a barrel is opened it should be emptied at once. Metal receptacles with rolled joints should be provided for carrying waste.

Frequent Source of Fire.

Lamps have been a fruitful source of fire on shipboard. Glass lamps frequently break or crack and should never be used. All lamps should have metal bodies and should be securely fastened in their sockets. They should be carried in substantial wall brackets or suspended from the ceiling and be well stayed to prevent swaying. The use of common table lamps, which are easily upset, should be prohibited. If electric lights are used, all wires in the hold, engine and boiler spaces, where cargo is carried on main deck and out of doors, should be in iron conduits. Switchboards should be of slate or other non-inflammable material and well clear of the woodwork back of them. The use of torches in the engine and boiler rooms probably cannot be prevented, but they should be carefully used and not left about when lighted.

The most hazardous type of steam vessel from the fire standpoint is the wooden tug boat. The boiler is usually the largest size that can be installed and is usually just as close to the woodwork as the law permits. To make matters worse, on the average tug there is a platform or grating over the boiler where wet lines are placed to dry out. Inside of the house over the boiler where the ventilation is poor the heat becomes excessive and the woodwork around the stack is ignited or the bunker sides will catch fire. A large percentage of the tug boat fires originate in this way and all could be prevented if good air space was left around the boiler and proper ventilation provided over it to allow the hot air to escape.

Freight Steamers Hazardous.

Freight steamers are also a hazardous class. It is impossible to lay down any set rules for extinguishing a cargo fire, for both the cargoes and the vessels carrying them are so varied. Every compartment, however, should be fitted with a pipe running to the pilot house and air should be drawn from these pipes continuously. A fire starting in the hold could be promptly detected from the smoke issuing from the pipe which would also show exactly in which compartment the fire was located. In addition, each compartment should be fitted with a steam fire extinguisher so that steam could be turned on

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immediately when the fire was discovered. Every vessel carrying cargo on the main deck should have sprinklers.

The author also directed attention to the fact that there is one type of vessel on which there is no government inspection and on which fire losses have been numerous and heavy, namely dredges, pile drivers, floating derricks and drills. As a general rule these plants are lacking in fire fighting equipment.

All vessels should be so equipped with fire extinguishers that every part of them can be reached promptly and effectively by fire fighting appliances. Every second counts in fighting fire. The time lost in coupling up a hose which should have been connected may cause the loss of the ship. Approved fire extinguishers should be carried in every pilot house and in every galley. When a fire attains a size which is beyond the control of an extinguisher it becomes necessary to use hose. All steam vessels should have a steam pump and a hand pump and these should be connected to the same main, the hand pump for use in case steam is not up. In no case, even on the smallest boats, should there be less than two lengths of hose. Passenger steamers should all be thoroughly sprinkled, those having sleeping accommodations having a sprinkler in every stateroom.

Gasoline a Great Hazard.

Gasoline is of course the great hazard on gasoline boats. The tank and the engine should both be in watertight compartments, even though the bulkheads at each end of the engine only come up to the floor boards—and the feed pipe should be run outside the hull. All cabin boats should have ventilators to carry off the vapor. The problem of extinguishing fires on motor boats is a difficult one, as entire dependence has to be placed on extinguishers. A series of tests recently held demonstrated the fact that 64 sq. ft. of burning gasoline is too large an area for an extinguisher to handle.

On boats without power, where there is a donkey boiler, a steam fire pump should be fitted and a hand pump connected to hose on each end of the boat should always be installed. There should also be a liberal supply of buckets with draw lines attached. All vessels or groups of vessels should be in charge of a watchman both day and night to keep off thieves and tramps who have caused so many fires. Whenever possible the boats should be laid up under city fire protection. On large and valuable vessels steam should be kept on the donkey boiler when the boat is out of commission, permitting the hose and sprinkler system to be in constant readiness for use.

Discussion on Mr. McComb's Paper.

THE CHAIRMAN:—Gentlemen, you have all heard Mr. McComb's paper, which is certainly most interesting. I presume the precautions which he suggests as necessary to prevent fire will meet with pretty general acceptance as a desirable thing, but as in many other things, the things desirable from one standpoint are not necessarily desirable from other standpoints. I am sure that it is the wish of the author that the paper should receive very thorough discussion. I may say that the secretary sent a communication to Mr. Croker, chief of the fire department of New York City, inviting him or some of his representatives to be present here at the reading of this paper, and also to some of the officers of the supervisors or inspectors of the steamboat inspection service. I believe a representative of the fire department of New York City is here, and we will be very glad to hear from that gentleman, if he cares to say anything.

Discussion by Chief Kenyon.

CHIEF KENYON:—In listening to the reading of that paper, I don't think it interested you gentlemen very much. I want to say that the author made many excellent points, and he has shown a fund of knowledge of the duties of a fire chief. As to the classification of these different vessels he talks about, the different old schools and other suggestions and all that, I don't think it would matter much if they were all burnt up. There is one paragraph I am going to read: "It is the opinion of many that the laws relating to the steamboat inspection service should be amended. They should require that all vessels should be constructed, equipped, manned and operated in a manner that will thoroughly safeguard human life, and should be so worded, codified and classified that any one with ordinary intelligence referring to them could find what they are looking for and understand it."

The modern tendency, the tendency of today, is to get all the luxury that is possible, not alone in hotels and buildings, but in the modern steamship. Every device and every possible means is employed to cater to the fancies and the luxury of the traveling public. Now, I want to ask you gentlemen of this society if you have kept pace with the architects that are building these sky-scrapers, in protecting human life in steamships that are plying between here and Europe and other parts of the world. What have you done towards installing apparatus and equipment for these men who are going to sea, these ships carrying 2,000 and 2,500 people aboard, in a ship loaded with cotton, loaded with lumber and loaded with resin? These are combinations that are coming to this port every day. Do you mean to say you can tell me of the installations you have made or any you have worked at? You never gave this a thought. (Laughter.)

I have been called upon to extinguish fires every week on steamers plying between southern ports and European ports, where the only means they have of dealing with fires—and very dangerous fires, too—is the old steam jet, and I see this genetleman, who prepared this paper, says it is a very excellent means of extinguishing fires. Well, I differ from him; it is no means at all of extinguishing fires. (Laughter.)

Suggests System of Piping.

I would make a suggestion—it occurred to me while sitting back there and looking over that paper—that a system of piping could be installed from abaft the hatch combing leading to every compartment, that would be connected with a perforated pipe or sprinkler system, so that when you unscrewed the cap, you would not only have a means of locating that fire, but a means of extinguishing it. I have in mind an experience of a steamer that left this port two years ago with 2,200 people aboard, and she caught fire on the way to Europe, and after pouring steam into that compartment for three days, the temperature got so high that the plates were all buckling, and the captain fortunately thought of drilling holes and forcing five or six cylinders of carbonic acid gas into that compartment, so that she finally reached the other side, and when they took off the hatches, the flames leaped 75 ft. in the air. Now, I am not an alarmist, and I don't come here to frighten a lot of old ladies—

THE CHAIRMAN:—We have a great many military members, you know, who are not afraid of anything.

CHIEF KENYON:—They would be afraid of a big fire, all right. (Laughter.) I say the system of protecting from fire on board ship has not kept pace with other things. The inspectors go aboard ship and make a test with a pump; and when they start it up, it is like a double-barrel shotgun, you could not hold the hose in your hand two minutes. There is no proper cushion on the pump. Then they base a rule on the tonnage of the ship. I fail to see what the tonnage

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on a ship has to do with the loss by fires.

I merely wanted to make these suggestions to get you men thinking. It did not appear to me you were doing a whole lot of thinking over that paper; but there are some very good suggestions in it at that. (Laughter.) I don't know that I care to go any further, but if you appoint that committee, they can have any points of information I have got. I am much obliged to you, gentlemen, for your attention. (Applause and laughter.)

THE CHAIRMAN:—Gentlemen, you have shown so thoroughly by your applause that you have appreciated Chief Kenyon's remarks, that it is almost unnecessary for me to say that we thank him for his comments. Is there any one here from the supervising inspector's department? Can we hear from our own members? Surely, there is some one interested in the question of ships burning up. Mr. Stephens, have you anything to say on the matter of the yacht side of it?

W. P. STEPHENS:—I have not anything to say about it. It is a pretty big subject.

CHIEF KENYON:—It may not be out of order for me to say this, that in a motor boat the gasoline is liable to get all over the boat, and if it takes fire, there is just one thing for a man to do, and that is to get overboard as quick as he can. (Laughter.)

Loss of Life is Infinitesimal.

JOHN REID:—Gentlemen, from a shipbuilder's point of view, we have a challenge thrown before us by the gentleman who has just spoken, and while I cannot reply to him today, he has made one or two allegations. He asks what have we done to protect ships against fire? He also states that we have not paid the slightest attention to it. That is a very grave mistake he is laboring under. A great deal of attention has been paid to it. The results speak for themselves. Where is the loss of life in these liners? It is infinitesimal. And as to appliances, he says nothing has been done. He forgets one very important thing on the question of fire extinguishment, and I only mention one, where they used a carbonic acid extinguisher, and it put out a fire at once; and there are others that limit the supply of air and oxygen; and certainly, as a shipbuilder and a naval officer, I say we have done wonders on these modern liners, quite apart from the luxuries on board, to protect them. Where do you find this great loss of life on board ships, considering the number of people passing to and from this country? I will say this, that you lose more people from a fire in New York in a month than you do on these liners in a year.

Discussion by Mr. W. I. Babcock.

W. I. BABCOCK:—Mr. Chairman, I will say there are several passenger boats in service fitted with automatic sprinklers. I will say further that I think Mr. Reid has made a very good reply to Chief Kenyon's accusation. The chief is a good fireman, but he is not a naval architect, and when it comes to making a vessel fireproof, it is also very difficult to make a skyscraper fireproof. It is, of course, very easy to make a building so that a fire should be confined to one or two or three rooms, but you cannot manage a ship in that way. We had, two or three years ago, two papers, describing boats that were absolutely fireproof, one of them a side-wheel excursion steamer, and the other, I think, was a Pennsylvania ferry boat, to be used at Philadelphia; but when it comes to making fireproof construction all over a big ship, and especially for steamers that carry more people in proportion to their size than any others—for instance, the big Sound steamers—the naval architect in designing a ship of that kind has to consider a great many questions besides the possibility of the ship getting on fire; the question of weight, of the steel that is necessary, the question of sub-division, dividing the boat into compartments, all those things have to be taken into account; and we have to remember that it has to be built primarily to make money, otherwise there is no excuse for its existence. It all comes down to a question of dollars and cents. If you put all this construction into a Sound steamer, that you have in a skyscraper, you would have a boat that could not run and make money, because it could not carry passengers enough even if she would float at all, and in addition, the passengers would prefer a boat that would make speed, rather than a boat which, on account of construction, would be safer. Furthermore, it would be not only a much more expensive job to build, but a much more expensive ship to run, and if a boat of that kind was built, she would be immediately in competition with the older boats.

Water Transportation Safer Than Any Other.

Mr. Reid's point of the proportion of the loss of life to the passengers carried on board these ships is a very good one. I cannot quote statistics offhand, but I can say that passengers carried by water transportation are safer than by any other kind of transportation; they are safer than they are on the railroad; safer than in walking the streets of New York, so it is not fair to say that the architects of this society and of the country have paid no attention to the development of devices for saving life on ships. I do not say that for the purpose of criticising the chief in any way, who is entitled to his own viewpoint on the matter, but I simply state it as a fact.

PRESIDENT TAYLOR:—Gentlemen, I would like first to ask the author of the paper what are the four steamers that were nearly totally destroyed in the vicinity of New York in the last year. Can Mr. McComb tell me that?

MR. MCCOMB:—The steamer Manhattan.

PRESIDENT TAYLOR:—She was destroyed in Portland.

MR. MCCOMB:—And the Redfield, and the New York, and the Poughkeepsie.

PRESIDENT TAYLOR:—The Redfield was built when I was an apprentice, in 1864. The other was built a year or two before that. What was the other one?

MR. MCCOMB:—I think the New York.

Discussion by President Taylor.

PRESIDENT TAYLOR:—Now, this only goes to show you, gentlemen, what I have said on this floor before, that steamers in actual service are not burnt up very frequently. A very unfortunate accident happened here in the East river a few years ago that is still brought to your minds or the minds of the public very unnecessarily; that steamer was taken out, after being laid off all winter, with a crew that was picked up off the wharf at that time, and she carried a number of women and children and most of them lost their lives. It was a very deplorable accident, but it was very exceptional. My knowledge of steamers that have been burned, and which now goes back many years, tells me that they usually occur where steamers have been laid up for the season and then taken out without proper overhauling. Mr. McComb has named the Manhattan. She was lying at Portland, waiting for transfer to go to the Pacific coast; and the Redfield in the same way. They had no passengers on board, to the best of my knowledge and belief. All the large steamers that have been burned were burned while they were laid up. The New York was lying at Newburgh, and if the crew had not been so careless, the boat would never have burned. The Bristol, at Newport, was burned with only a watchman aboard, and the record shows he had punched the watchman's clock, and he must have punched the clock. Another steamer was burned at Portland or one of the ports of Maine, belonging to one of the eastern lines.

I said, several year ago, on this floor

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that if I believed that one of the Fall River Line steamers could possibly be burned, as the Bristol was burned, as the New York was burned, in actual service, I would never draw another plan or have anything to do with the construction of a ship, any more than I would commit suicide. I believe it is impossible—not impossible, but it is improbable—that a fire, such as that of the Slocum, could take place on a well-regulated line, carrying passengers, in the vicinity of New York.

No One Man Knows Everything.

Now, I admire the chief's confidence in himself and his knowledge, but his statements only go to show that there are really none of us that know everything. I know nothing about putting out a fire, compared with his knowledge of putting out a fire. He knows more about that in one minute than I do in a day or in a month. On the other hand, I am quite certain that the naval architects know more about building vessels in one day than he does in all the time of his existence, and that is no reflection at all on the chief. We follow along the lines of our profession, and do not always perhaps see what is on each side of it. The necessities of the naval architect's profession have broader problems than any others, and no one outside of that profession really understands the difficulties of that particular study.

The later boats that have been constructed, a great many of them, have been supplied with the very things the chief asks for. Mr. Babcock has said that steamers on the lakes have been supplied with automatic sprinklers. I had myself something to do with the rebuilding of the Plymouth and with the Pilgrim, and I put fire sprinklers there; the same with the Peconic. When the New Haven was built, the owners directed that they should not be put on her, for good and sufficient reasons to them.

An Absolutely Fireproof Vessel An Impossibility.

We cannot make it absolutely impossible to burn up a steamer of that description, but it is impossible to make a fireproof steamer, because no fireproof construction you can possibly put on a floating vessel and carry it on your displacement, can restrain the fire that will come from the cargo, if allowed to take place. You can see from time to time in the city of New York—you don't need to go any further for experience with fireproof buildings—I can show you the ruins of one now down at Fourteenth street, where the fireproof construction was absolutely twisted and torn fairly apart; and no steamboat construction could stand the effect of a fire underneath it.

We have taken—I may speak for the concern of which I happen to be vice president—we have just taken another contract, and it is on behalf of the owners that I am now speaking. The contract was made to rebuild certain steamers and make passenger steamers of them. Two or three days after this contract was made, a discussion arose among the committee who had charge of the matter, as to what could be done toward making them safer, and they added a very material sum to the contract for the purpose of trying to make them as far as possible not fireproof, but safe from destruction by fire.

THE CHAIRMAN:—Slow burning?

Problems of the Naval Architect.

PRESIDENT TAYLOR:—Yes, slow burning. Now, think for a moment; take the steamer Commonwealth, she has three or four decks; if we made the structure of each of those decks anything like the structure of this building in which we stand, there is not enough displacement to carry that weight; it is an entirely different construction, and people on shore forget that, and sometimes I think our own people possibly forget. Also, as to steel construction on vessels, we have in this vicinity a steamer, built entirely of steel, the steamer Maryland. In the summer time, they have to put down wooden gratings so people can walk on them, the decks become so hot, and in the winter time the water freezes in the staterooms.

These problems all come to the man who studies the particular business he is in, and, of course, the man whose profession is the putting out of fires—and I want to say I believe New York City is the best supplied city in the world in that connection, but these are practical questions that do not come to such a man, and he does not understand them, and he does not know. The chief shows that right here; he does not know the care and the thought of naval architects in constructing those vessels.

Gentlemen, I have found in all well-regulated lines managers are desirous of fighting the chance of loss of life, and in looking up statistics I find fewer lives have been lost—including even the Slocum disaster, which was most deplorable in every way, and which should never have happened—but even including that, there are fewer lives lost on steamers than on the railroads, and there have been considerably more lives lost in the city of New York, with all its wonderful fire department in the last year than has been lost on steamers in two years. (Applause.)

Kenyon's Life as a Sailor.

CHIEF KENYON:—Gentlemen, I want to say a few words to correct what seems to have been a false impression conveyed to you. Now, I started in to arouse you men, to get you to think (laughter), and I find you are thinking along the lines that I imagine the side of a ship is the side of a house. Now I want you men to understand that I spent 14 years of my life, in the prime of my youth, studying ships, and I am not a landsman, I am a sailor, and a master, too, and I have had several fires at sea and know just what they are. I was one of the crew of the Abyssinia when she burnt in the Irish Sea, and I did not come here with the idea that I was coming up against people from Squeduck or somewhere like that. (Laughter and applause.) The simple proposition I made is this: It is not a question of expense, to my mind, because what I suggested is a mere matter of a few dollars, it don't amount to anything; but expense seems to cut quite a figure with some people. An old ship owner in Liverpool, some years ago, had a few old hulks, and he put on them a few bags of biscuit and things of that kind and sent them to sea; he did not want them to come back, he wanted the insurance, that was all.

Now, it is a very hard thing to locate a fire on a ship. You have a ship with three or four decks in her—you have the lower hold, you have the orlop deck, you have the steerage deck, perhaps those decks are battened down and full of cargo; how are you going to determine what deck, if a fire occured, it is on? I have had some experience in that line, and I find captains of ships coming in here bringing them from London to New York and from New York to London and everywhere else, where they have had a fire and the fire has been extinguished, and it is not extinguished at sea.

A MEMBER:—Did you sink the ship?

Extending Pipes Into The Hold.

CHIEF KENYON:—No, I never sank anything. What I suggested was a manifold of pipes alongside the hatch, with a screw cap to the pipe, and have one leading to the lower hold, one to the orlop and one to the steerage, and by taking that cap off you will determine where that fire is, and once you locate the seat of the fire, it is like locating the seat of a disease, and the rest is easy, and if you put a hose into that you have the fire out in a very short time. There is not much expense in extending that pipe into that hold. I am not a naval architect, but I know

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enough about a ship to know that it does not cost very much.

Now, that was simply my suggestion. I say they have no other means today except the steam jet, and I know that where that steam is going into a hot fire, it is of no use whatever for controlling that fire. I have had hundreds of vessels come in here in that condition. I have also seen where they have had the plates of the ship buckled up.

Now, these are all facts which can be easily proved by my records. Take, for instance, the steamer that was mentioned here, the Commonwealth, or the Pilgrim, they are fine ships, like any other ships that are finished in woodwork and varnished, and if any fire broke out on these ships, it would go through her like a race horse. What happens? If anything happens, they make for the nearest dock. The ships I have in mind are particularly ships that were carrying a lot of cotton and lumber.

I am not reflecting on the splendid organization that is keeping watch—and the watch that is kept on a ship I know somethig about, I know what watch is kept on a ship as well as any man in this room; I know it is that continuous attention to detail and the careful watching on those vessels that have prevented many accidents of that kind.

Now, I do not want to take up your time, or want you to think that I am trying to cast any reflections in this matter, I am merely suggesting that water could be pumped with very little expense into any compartment, and it could be flooded either through those sprinkler pipes or a system of perforated pipes, just as easy as a steam jet. I am sorry to have taken up so much of your time and I thank you for your attention. (Applause.)

Constant Watch on Board.

PROFESSOR HOVGAARD:—I just want to call your attention to one fact, in which a ship differs so essentially from a building on shore, and that is, as the chief has just remarked, the constant watch that is always kept on board ship, and the moment there is a fire, the whole ship's company is turned into a fire company, just the same as if a building were on fire here in the city of New York, and the whole of the people in the city were turned into one complete fire department. That accounts for the few serious accidents that we find on board ships in that connection.

WILLIAM L. R. EMMET:—Mr. Chairman, I cannot refrain from saying something on this subject after what the chief has said. I am not a naval architect or a fireman, but I feel very strongly that what Chief Kenyon has said is absolutely right. If you put steam in, it prevents combustion, because it fills the space and excludes the air, but if you go down into the hold of the ship, you want to have something to take out the heat. Every pound of water that goes out will carry so many heat units with it. I have happened to see sprinklers at work in a big space full of combustible material, and that is how it worked; the sprinkler distributes a small amount of water, which is evaporated, and the evaporation of that water absorbs a large amount of energy and the fire goes out locally. I think what the chief says about putting pipes into the hold of the ship or putting a sprinkler there, is right—you would not have to fill the hold full of water; the sprinkler is released somewhere below the boiling point; if you send the water there, the water will be released, and then steam will be generated, and the steam will carry away the heat units, and the cargo instead of being all wasted and the plates buckled, will be all right, and the fire will subside and go out. I am inclined to think the chief is absolutely right in what he has said.

Fires on Lake Steamers.

H. PENTON (communicated): — In Plate No. 3, Mr. McComb shows a view of what he calls a modern steel fireproof steamer, and in Plate No. 4 a view of the same ship after a fire. Both of these views are of the steamer City of Cleveland, which burned at the fitting-out dock at Detroit during construction and with her fire-fighting equipment consequently inoperative, and even incomplete, and with no crew whatever on board.

If my memory serves me, the fire was discovered early in the morning, some hours before the workmen had begun work, thus bearing out what President Taylor has said in regard to ships burning alongside the dock. Mr. McComb further, I think, does an injustice to Vice President Frank E. Kirby, the designer of the ship, as well as her builders, since I do not think either have ever made any claim that the City of Cleveland was "fireproof."

As regards the steamboat inspection rules, I may say that ship builders and the technical press for years have been complaining of their absurdity. Perhaps in the fulness of time, something may be done towards their betterment.

As regards sprinklers, I very much doubt their value aboard ship, especially those of the day or excursion type. I do not believe that a sprinkler is at all likely to go into operation on such a boat; I believe it highly improbable that the necessary temperature point will be reached before the fire has gone beyond control, because of the open decks, and yet that is the very type of ship above all others which is most in need of fire protection, so far as life is concerned. Mr. Reid and Mr. Babcock are both beyond question correct in their statement as to the very small proportion of loss of life among travelers by water. The records of the Department of Commerce and Labor will show that the loss of life from all causes among steamboat passengers is a very small percentage indeed, merely fractional as compared with the percentage lost among travelers by rail, and the loss by fire is infinitesimal.

Mr. McComb is very much in error in his statement regarding three boats having been burned within the last month in the open lake. The three steamers he mentions, the Wasaga, the Lycoming and the New York, were all three what are known as package freighters, of the older wooden type. The Wasaga, formerly the Wissahickon, was built in 1876 and was burned at a dock in Copper Harbor, Lake Superior; the Lycoming was built in 1880 and was burned alongside the dock at Rondeau, Lake Erie; and of the three the only boat burned under way was the New York, on Lake Huron, and which was built in 1879, and at the time the fire broke out, her crew were to the last man engaged in a struggle to save a foundering ship, and even had she been provided with the most approved equipment, and to Mr. McComb's entire satisfaction, the question of the choice which would have been made by her crew as between burning or foundering, is one each member may decide for himself.

THE CHAIRMAN:—Does any other member wish to comment on the paper? If not, the author will be given a chance to reply to any of the remarks.

Mr. McComb's Reply.

MR. MCCOMB:—In regard to sprinkler systems generally on passenger steamers, while the Goodrich line running out of Chicago, and the Sound steamers out of New York, are equipped with sprinklers, most of them are not. The saving in insurance alone on those boats would more than equal the cost of installing sprinklers, and the vessel owners would be in money at the end of the year by installing sprinklers.

The types of vessels are so radically different that different methods of fire extinguishing apparatus have to be put on them. On boats like the Old Dominion boats and the Mallory line boats going south, the principal danger there is a cargo fire in the hold, and as Chief Kenyon suggests, the means of

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admitting water to each compartment is a good idea. I suggest running those pipes to each compartment of the hold. The principal danger is not from fire in the hold, it is fire in the cabin.

In regard to what President Taylor says as to boats not being burned up more in commission, I will say that I know of three boats having been burned up in the last month, all in commission. The steamer Wasaga was burned up while on Lake Superior; the steamer Lycoming was burned up on Lake Ontario; and the steamer New York on Lake Michigan, and all three were total losses and were all three actually on voyages in the middle of the different lakes when the fires started.

President Taylor is absolutely right, and Mr. Babcock, too, that on the lines of good ownership, like the Goodrich line and the Sound steamers, every precaution is taken to save life; but those are not the boats that are burning up. It is people who are not making money or hardly any money who are evading the law as much as they can; and the law now ought to be improved. The steamboat inspection laws I do not consider are as good as they could be made, and that is why I suggest to the society that it should appoint a committee to take up the question of the inspection laws so that they may be made to conform to the safety improvements and the necessities of the present day; and if a man wants, now-a-days, he can have his boat very well equipped with safety appliances, and I would like to urge on the society to appoint such committee, which, I think, would result in a great deal of good.

The program of papers was concluded with the reading of Charles B. Page's paper on "Two Marine Installations of Producer Gas."

The Banquet at the Waldorf-Astoria.

Ringing words of admonition to the American people to awake to their neglected opportunities of strengthening their commercial relation with the South American countries and to an appreciation of the fact that foreign shipping interests are doing all in their power to prevent the upbuilding of the American shipping industry were sounded by Hon. C. H. Sherrill, United States minister to the Argentine Republic, at the annual banquet of the society held at the Waldorf-Astoria, Friday evening, Nov. 18. "It is time that the people of the United States awoke to their folly of not believing that foreign shipping lines are trying to restrain the helping of the shipping business in this country. Why should not we protect our shipping when we protect our other lines of industry? When anyone says that the American ships plying between Buenos Ayres and New York are adequate for the trade at present, either he is interested in foreign shipping or in the unpatriotic pursuit of keeping out other Americans from that country who might interfere with his business. If we give only the same protection to our shipping interests as we do to the other leading industries, etc., it will not be very long until the American flag will be back on the seas in the way that won for us the war of 1812."

Wonderful Advance of Argentina.

Mr. Sherrill spoke of the wonderful advances that have been made by Argentine Republic, both in population and in the general development of national life. He spoke of the stupendous resources of the country, much of which dealt with the great fertility and productiveness of the soil, and told of the effective service which the diplomatic corps of this country was doing to encourage the increase of trade from these countries with American merchants and manufacturers and which is in line with the general policy of President Taft and Secretary Knox. He stated that in the case of Argentine Republic the yearly trade with this country had been increased by such methods from $47,000,000 to $80,000,000.

Admiral Garcia, of the Argentina navy, who is now in the United States watching the construction of two battleships for his country, gave an outside impression of the facts outlined in Mr. Sherrill's address. Admiral Garcia said that a few years ago the American flag could be seen flying from many merchant ships in the harbor of Buenos Ayres, but that it is seldom to be seen now among the many ships that enter that port.

Commander L. S. Van Duzer, of the United States navy, declared that it seemed to him that it was time that the people of the United States awoke and built a few ships and that he hoped to see before many years a merchant marine worthy of our present great navy.

Loving Cup Presented to Admiral Bowles.

An interesting event in the evening's program was the presentation to Admiral F. T. Bowles, past president of the society, of a massive silver loving cup. The presentation was made by Admiral W. L. Capps, formerly chief constructor of the United States navy. Admiral Capps tendered the gift on behalf of the society as a token of esteem and affectionate regard for the retiring president. Admiral Bowles, in responding, thanked the society for its mark of regard conferred upon him and stated that he valued most highly the moment of his arising to express his appreciation to his fellow members for the honor given him. "It is unfortunate that the inadequacy of ship building in the United States causes such close competition in business among us, which, I fear, sometimes may give rise to some hard feeling. Yet here at these meetings we can meet on a social and friendly basis and help each other. Each member can, in some manner, assist in raising our profession before the world." President Stevenson Taylar, of the society, presided as toastmaster of the banquet. Among the others who spoke during the evening, or who occupied seats at the guests' table, were: Secretary-treasurer W. J. Baxter; R. W. Dana, secretary of the Institution of Naval Architects, London, Eng.; Commander Vassilieff, Russian naval attache; Commander Baron F. Von Preuschen, Austrian naval attache; Hon. Chas. E. Littlefield, former member of congress from Maine; Nicholas F. Palmer, president Quintard Iron Works, New York; H. S. K. Williams; Admiral H. I. Cone, engineer-in-chief, United States navy; Lieut. Commander B. d'Azy, French naval attache; Commander H. Retzman, German naval attache; F. A. S. Franklin.

Mr. Dana, as secretary of the Institution of Naval Architects, London, Eng., expressed the hope that the American representatives would appear in large numbers at the congress of naval architects to be held at London next year.

Obituary

Capt. D. P. Craine, one of the oldest masters on the lakes, died at his home in Milwaukee on Nov. 12. He was forced to leave his boat, the William Livingstone, about two months ago.

Capt. John Edwards died at his home in Detroit on Nov. 19, at the age of 73 years. He had sailed passenger boats on the great lakes for over 40 years. His first command was the Arrow, which ran between Detroit and Toledo about 40 years ago. He was master of the steamer City of Erie, of the Cleveland & Buffalo line, when he retired.

Capt. H. T. Archer, of Cleveland, died at St. Mary's hospital, Detroit, on Nov. 26. He had to quit his boat on the last trip at Detroit. Capt. Archer was about 56 years old and had sailed since boyhood.

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Naval Cost Keeping

In the October issue of THE MARINE REVIEW, we gave a complete description of the Meyer system of navy yard cost keeping and showed that the system violated the mandatory provision of the law that all indirect charges should be included in the cost of work. We showed that the so-called naval costs are not in reality costs, but are a mass of figures which mean nothing. We showed that the system permits of extensive juggling of accounts, and that this is taking place.

We did not, however, expect the naval authorities to admit that the cost system was so designed as to permit the accounts to show any results that might be desired. It seems, however, that this is the case.

The Army and Navy Register usually voices the sentiments and views of the naval authorities, particularly of the department in Washington, and always keeps a club handy for those who dare to criticize the naval admintration. In a recent issue of this journal there appears under the title "Cost of Battleship Florida" the following remarkable statement:

> The naval authorities are confronted with the dire prospect that the cost of the battleship Florida, under construction at the navy yard, Brooklyn, may exceed the limit of cost of $6,000,000.* Prompt steps have been taken to prevent any such excess, and the effort will be made to so arrange the remainder of the work to bring the total cost within the prescribed amount. *There are those who believe it is next to impossible to determine what a battleship actually costs, and that in the end, it is largely a question of bookkeeping which may be made to show that a limit of cost has been exceeded or has not been attained.*

The italics are ours. THE MARINE REVIEW in its issue for September, 1909, applied this identical phraseology to department costs for which, among other things, it was and continues to be, roundly abused. Nevertheless it is the truth, and the exact truth regarding not only the Meyer system but the whole department system. The cost of a battleship or anything else is merely a question of bookkeeping, and the records can be made to show that the ship cost five million dollars or seven million dollars, just as suits the purpose of Mr. Meyer and his satellites. The cost "system" has been designed for the purpose of juggling figures. Mr. Meyer, with the aid of this "system," should be able to prove by cost figures that his system of management is a success. No doubt he will try to do so.

It will be interesting to know the steps that have been taken by the naval authorities to prevent the limit of $6,000,000 being exceeded. Have the naval authorities suddenly increased the efficiency of the New York navy yard and thereby reduced the cost of the work? Not by any means; that is not the navy way. The steps that will be taken will be to juggle the cost figures, taking away charges that properly belong to the ship; or leave undone work which is required by the specifications, and after the ship has been commissioned do this work and charge it to one of the annual appropriation bills; or supply furniture, equipment, etc., under a different account, and consider that these items are not included in the limit of cost. It is more than likely that it will be necessary to take *all three* of these steps to keep the cost below six million dollars.

The New York Shipbuilding Co. is building a sister vessel, the Utah. It is unfortunate for that company that it cannot follow the naval methods, and show a very handsome profit for its stockholders. As comparisons of cost between vessels built in navy yards and private ship yards are frequently made (or attempted) it will be interesting for congress to know exactly the steps taken by the naval authorities to reduce the cost of the Florida.

The contract price of the Utah is $3,946,000.* The cost of the Florida according to the *Meyer "cost records"* will be at least $6,000,000, or 50 per cent greater than the cost of a sister vessel built in a private ship yard. The loss to the people of the United States according to naval "cost records," due to the inefficiency of naval administration, *is over $2,000,000 on one ship!*

But this is by no means the real loss. A reference to the October issue of THE MARINE REVIEW will show

*Hull and machinery and exclusive of armor and armament.

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the many large expenses that are *not* included in naval costs. In a private establishment these expenses must be charged to the work produced and they are included in the contract price. If these expenses are included in the costs, the actual cost of the Florida to the government will be over $7,000,000, or perhaps nearer $8,000,000! The actual cost in a government navy yard is approximately twice the cost in a private yard, and on each ship of the Florida class the people lose approximately $4,000,000.

The Florida is a ship of the popular "all big gun" class, of 23,000 tons displacement and 20¾ knots speed. Bids were recently invited on another ship of 27,000 tons displacement and 21 knots speed, and, although only one lone bid was received, for reasons referred to elsewhere, even that figure was $5,760,000, or over $200,000 less than the expected cost of the Florida and included, besides an anticipated profit, of course, all those overhead charges from which the naval-built ship is free; interest on investment, salaries, depreciation and maintenance, taxes, insurance, etc. Those familiar with plant operation can easily work the *direct* cost of the proposed new ship back to probably little over $4,000,000.

One by one the navy department's chickens come home to roost.

Nor is this all that can be said on the navy yard "reorganization," which includes the cost keeping. Additional evidence of its gross inefficiency is uncovered by THE MARINE REVIEW each day. Many of these facts cannot be disclosed here, but if congress will undertake an investigation, and will protect witnesses from the wrath of the discredited department officials, the witnesses will be found available.

The navy yard located in Mr. Meyer's home city, is apparently the most inefficient of all. This is not surprising, for this navy yard is, naturally, the one which is most subjected to the Meyer "influoence."

A few pertinent questions might be asked by an investigating committee which would bring forth interesting and startling information, among which the following are suggested:

Is it a fact that the commandant of the Boston yard receives instructions, which may be euphoniously called suggestions, from certain Boston congressmen, but which are, nevertheless, accepted and carried out?

Is it a fact that a head of department in the Boston yard contemplated changes in methods of doing work which would have resulted in greater economy, and that certain congressmen called on the commandant and pointed out that these changes might influence the elections and that the commandant immediately directed the head of department to discontinue the economical methods,—at least until after election?

Is it a fact that Mr. Meyer or his so-called aides in personal letters to the commandant directed that no changes be made toward more economical methods until after the election?

A careful investigation will show that navy yards have not been removed from politics; it will show that the yards can be, and are, used for the benefit of the machine politicians.

Much information is already available regarding conditions in the Boston yard, and more is accumulating, and startling disclosures, which will be supported by documentary evidence, may be shortly expected.

It is a matter of common knowledge that the commandant is an officer who knows little or nothing about industrial management and who cares less. He has practically turned the management of the industrial department over to his aide, another line officer, who has also had no experience in industrial management.

This officer is one of that loyal (?) assembly of line officers who gathered on the Panther at the League Island navy yard, and passed resolutions severely condemning the Newberry plan of administration, and which published and distributed circulars containing these insurgent declarations. It is interesting to note that these officers were not punished, but on the contrary were rewarded for this act; then compare the treatment that these officers received with the punishment given officers who, in the course of their duty, have given testimony before the house naval committee.

This once insurgent officer, as aide to the commandant, and as virtual head of the industrial department of the navy yard, is now in position to punish those officers who favored the Newberry organization and he does not hesitate to use his authority for this purpose. Let congress call as witnesses the officers on duty at the Boston yard and compel them to testify as to the conditions that exist in that yard.

There is another mutineer on duty in the Boston yard. The assistant to the engineer officer is a line officer, who was a ring-leader in the Panther meeting. Perhaps he suggests to the aide to the commandant some of the acts of the latter. It is at least rumored in the Boston yard that he makes a most efficient tale bearer. No, the Meyer scheme is not given a fair show in the Boston yard; at that yard there exists an administration of petty spite and revenge; but after all, this appears to be the object of the Meyer organization.

Conditions at the New York navy yard appear to be but little better than those at Boston. It will be interesting for the naval committee to inquire how Mr. Meyer's promises made to the committee last year regarding the turbine casings of the Florida have been kept. Did the machinery division finish this work in the promised time, and what was the cost? It will also be well to investigate the *reported* cost of this work.

At the New York yard they have peculiar ideas of the purpose of costs. The accounting office is a little kingdom in itself; it is situated in a building remote from the offices of the manufacturing department. Everything goes into this office, but little of value comes out. The officers of the manufacturing department cannot obtain the daily expenditures on the many jobs; they do not know how the cost of any job stands; they do not even know the men who worked on a job on the previous day; and there is no way in which they can obtain this information. Perhaps they realize at New York that cost figures under the Meyer scheme are of no value, and act accordingly, or what is more probable,

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that they are *too valuable to be kept properly.*

The committee could also ask some pertinent questions as to the conditions of the turrets of the battleship fleet when the ships left the yard. THE MARINE REVIEW has learned that the work was unfinished and that the guns could not be fired. Why was this? Is it possible that the inefficiency of the machinery division, presided over by line officers, prevented these small jobs being finished during the long stay of the ships at the yard? Is it possible that the ships were sent from the yard with the work incomplete in order that the gross inefficiency of the yard under Meyer methods could be hidden? If these were the objects, they have not been attained, for the facts are known and can be presented at the proper time. If the committee will search the navy department files, it will perhaps find a letter from the commander-in-chief protesting against the work done at the New York yard.

If the committee will look still further it may find *two* letters from the ordnance officer of the Rhode Island on the same subject, and accompanying one of these letters will be found a report from the commanding officer written in no uncertain terms protesting against the work. It will be interesting to read the replies of the navy department to these letters. It might also be a pertinent question to ask if these protests had any bearing on the detachment of the commanding officer.

Such are the navy yard and the navy under the Meyer reign of terror, and the American people must pay the price. If they do not learn the truth it will not be the fault of THE MARINE REVIEW, even though certain department officials have declared they intend to put a stop to it. This, however, is only another sample of the "four-flushing" which now passes for ability in the navy.

Side-Tracking Admiral Capps

It was announced in Washington on Nov. 18 that Chief Naval Constructor Capps is to visit the Philippines on a mission of great importance to the navy under an order detaching him from duty on the Atlantic coast and directing him to proceed abroad on special temporary duty. The chief constructor is to make a careful examination of the navy yard at Cavite, in Manila harbor, and of the naval stations at Olongapo and Subig bay. The report of Constructor Capps will enable the navy department to fix the amount of the estimate of appropriations which must be submitted to congress this winter.—*News Item.*

It is scarcely to be believed that the senate and house committees and congress will fail to see the motive for this latest bit of vindictiveness on the part of Secretary Meyer and his constellation of "aides." Capps was forced to relinquish his post at the head of the bureau of construction because he dared to have views of his own, and he is now to be sent to Manila, where he will be out of the way while congress is in session. Capps is a dangerous man to have around while naval committees want to know things. He knows more about the navy and naval affairs than any other officer in Washington. He knows all about the workings of the Meyer scheme of navy yard management, designed to make comfortable shore berths for swivel chair sailors. He knows it is a failure, and why, and has the means of proving it. Worse than all, he has what neither Meyer nor his aides have, the confidence of congress; he speaks the truth; a trait far from universal in the department of today.

As to what he will find on the eastern stations and how his report and his standing will be used as a basis for demanding further millions for the clique to spend, there can be little doubt, and the move has some cleverness to it.

He must not be allowed to tell what he knows nor be available to disprove the statements which will be made to congress. This is perhaps one of the lessons in diplomacy Mr. Meyer learned in Russia. If congress takes any action on naval legislation without calling Admiral Capps before it and demanding that he tell what he knows it will commit a serious blunder. There are plenty of others in the service too who would welcome the chance to speak out if they are invited to do so, and not junior officers either, but officers of high rank, who see and deplore the injury that is being done the service. But what is far more serious, the nation is losing confidence in the navy. Even the patriotism of naval officers is in question. Many consider that numbers of naval officers are merely self-seekers, whose principal aim in life is not their country's welfare, but is to bend all their efforts to self-advancement, to efforts to increase their importance, to increase their comforts, to secure shore duties for which they are unfitted; and all of this at the expense of the good of the navy, at the expense of the country which they profess to love and serve.

There is but one remedy—a real investigation on the part of congress, where witnesses will be protected and where they can tell the truth without fear of punishment.

Features of the Naval Architects' Meeting

The recent meeting of the Society of Naval Architects and Marine Engineers was in several respects notable. The list of papers included several of excellence, and the discussion was fuller than usual.

Sir Wm. White's paper, printed in abstract elsewhere, will doubtless draw forth an even more extended written discussion than was brought forth at the meeting and the transactions will be enriched thereby. To be sure, it treats on a subject of which comparatively few are qualified to speak and if there is one fact which Sir William's paper has brought out more clearly than another it is that even the naval experts themselves are all abroad. It emphasizes and drives home the argument which THE MARINE REVIEW has so consistently championed that naval construction is pure guesswork, and that proof of the wisdom of any design is absolutely lacking. Sir William, out of his own ripe experience, abundantly illustrates the ever-changing view of those who are, for the moment, uppermost in the struggle to incorporate their notions in war ship design. In only one thing are they agreed, and that is in the need for millions more

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to spend, a claim that lacks proof most of all. It demonstrates more clearly than any words of ours could that the demand for a navy, an army, fortifications, yards and waste, originates with, and is most clamorously supported by those whose trade is war, while all the efforts of those whose business is peaceful and commercial and therefore not spectacular, seemingly avail nothing in support of a merchant shipping.

The outstanding feature of the meeting was Elmer Sperry's paper on the gyroscope. It treats of a subject big with possibilities, and apparently in no sense chimerical. It goes far beyond the mere question of personal comfort to passengers and crew and in the direction of additional safety for the ship. It is much to be regretted that no opportunity was afforded for oral discussion of this paper, which was one of the most valuable ever offered to the society, and it is to be hoped that the transactions, when printed, will be found to contain a liberal communicated discussion. That the paper and the apparatus possessed the greatest interest for everyone present was demonstrated by the way the members crowded about Mr. Sperry and his model. The performance of the latter was well described by President Taylor as "almost uncanny."

The withdrawal of the paper on "The Propelling Machinery of S. S. Creole" was a keen disappointment to probably the greater part of those in attendance, who looked forward with joyous anticipation to a drawn battle between the champions of the turbine and the veteran reciprocating engine.

That the postponement of the paper and the consequent discussion for a year will not result in diminished interest may be taken for granted.

The author of the paper on fire protection aboard ship stirred up a hornet's nest, and the discussion makes most interesting reading. There are many more profitable subjects of discussion than the loss of life by fire aboard ship. As a matter of fact the report of the Steamboat Inspection Service just issued shows the loss of life *from all causes* among both passengers and crews to have been, during the year, 379 for 328,666,000 passengers carried, a ratio of 0.000001 (1-1000 of 1 per cent), and we have not sufficient space to further subdivide this fraction for those lives lost by fire.

Altogether the meeting of 1910 was one to be remembered with satisfaction.

Our Merchant Marine

President Taft in his annual message to congress, just published, comes out with greater directness than any other president before him in urging the rehabilitation of the American merchant marine. He does more than urge the enactment of necessary legislation, but points out the danger of the present situation as well. He directs attention to the fact that unless prompt action is taken the completion of the Panama canal will find the United States the only nation unable to avail itself of it. This is a telling point and the issue is quite pertinent. If something is not done between now and the opening of the canal to stimulate American shipping in the over-sea trade, there will undoubtedly be made an attack upon the coastwise laws by foreign interests. Straws are already beginning to indicate the way the current is flowing.

In an interview in the *Railway and Marine News*, of Seattle, George B. Dodwell, senior member of Dodwell & Co., of London, operating the great Blue Funnel line to Pacific coast ports via Suez, points to this very circumstance. He says there are not sufficient American steamers to handle the business which will develop between the Atlantic and Pacific coasts of the United States when the canal is completed, and as foreign vessels are excluded by the coastwise laws from this trade, high rates will prevail and the transcontinental railways will have no competition. How's that? Here are his very words:

> Preparations must be made and made soon by the American people to take care of the great trade which is bound to follow the opening of the Panama canal. At present there are not sufficient American steamers to handle the business which will develop between the Atlantic and the Pacific coasts, in which trade, as is well known, foreign vessels are not allowed to operate under your coastwise laws. If ample tonnage is not built for this business very high freight rates will prevail and the canal will under those conditions offer no competition to your overland railroads. I believe the United States should have a merchant marine of its own. Of course building and operating expenses in this country are heavier, but this exclusive coastwise privilege is equal to a subsidy to your merchant marine.

It is time for the American people to get busy and take decisive steps to protect its own interests. There is not a minute to lose. The Panama canal will be open to commerce within three years and ships cannot be built in a day. Legislation should be immediately enacted which would make the country self-contained as a maritime nation.

President Taft also emphasizes the fact that we lack transports and a naval reserve to man them and that we will never have these necessary adjuncts of the navy until we create a merchant marine. The president's exact words are:

> Another instrumentality indispensable to the unhampered and natural development of American commerce is merchant marine. Perhaps nowhere is the need for rapid and direct mail, passenger and freight communication quite so urgent as between the United States and Latin America. We can secure in no other quarter of the world such immediate benefits in friendship and commerce as would flow from the establishment of direct lines of communication with the countries of Latin America adequate to meet the requirements of a rapidly increasing appreciation of the reciprocal dependence of the countries of the Western Hemisphere upon each other's products, sympathies and assistance.
>
> I alluded to this most important subject in my last annual message; it has often been before you and I need not recapitulate the reasons for its recommendation. Unless prompt action be taken the completion of the Panama canal will find this the only great commercial nation unable to avail in international maritime business of this great contribution to the means of the world's commercial intercourse.
>
> Quite aside from the commercial aspect, unless we create a merchant marine, where can we find the seafaring population necessary as a natural naval reserve and where could we find in case of war the transports and subsidiary vessels without which a naval fleet is arms without a body? For many reasons I can not too strongly urge upon the congress the passage of a measure by mail subsidy or other subvention adequate to guarantee the establishment and rapid development of an American merchant marine, the restoration of the American flag to its ancient place upon the seas.

Bid for New Battleship

The Newport News Ship Building & Dry Dock Co., Newport News, Va., submitted the only bid for the construction of the new 27,000-ton battleship authorized to be constructed at a private yard, bids for which were opened by the navy department on Dec. 1. The Newport News company submitted four bids, as follows: Hull and turbine machinery (Parsons type), in accordance with plans and specifications, $5,970,000; with Curtis turbines, $5,775,000; hull and equipment in accordance with specifications, reciprocating engines, $5,830,000; with Curtis turbines, $5,760,000. The company agrees to construct the battleship in 36 months and guarantees 21 knots speed. The sister ship will be built at the New York navy yard. It is pertinent to note that congress appropriated $5,000,000 for this navy-built battleship, which is higher than any of

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the bids of the Newport News Co., notwithstanding which the navy department is now asking for an additional million, making seven millions in all, saying that the vessel cannot be built for any less.

Lack of competition for the construction of the battleship is attributed to the provision in the naval appropriation bill that the work must be done in accordance with the eight-hour law. Several ship building firms informed the navy department that a rigid enforcement of the provision, covering not only their own work but the work of sub-contractors as well, would prevent them from undertaking the task within the limits of the appropriation. The Fore River Ship Building Co. sent the following letter to the department:

"Referring to the department's circular of Sept. 27, 1910, inviting proposals under Classes 3 and 4 for the supply and installation of machinery for the battleship which is to be built at the navy yard, New York, and under conditions as amended by the department's memorandum of Nov. 18, 1910, we beg to say that while we seek to supply the propelling machinery of the vessel we regret we cannot see our way clear to submit a bid which will be either satisfactory to us or attractive to the department under the conditions of the circular. Our reasons are as follows:

"First: The necessity of organizing a force at the navy yard to install and erect the machinery under conditions which are in important respects not definitely known.

"Second: The requirements of the circular placing upon the contractor the conduct of the trial trip with guarantees of speed and water consumption which are difficult, onerous and such that it is impossible to prepare an estimate of cost. In our opinion the department which determines all conditions of both hull and machinery, should conduct the trial trip and the contractor be held responsible only for the work performed by him.

"Third: Risk involved in the guarantees is out of all proportion to the part of the contract which the contractor performs since the total cost of the machinery approximately is 28 per cent of the whole cost of the hull and machinery and of this, 20 per cent is in materials which the contractor buys, leaving but 8 per cent representing the labor and expense furnished by the contractor himself."

The new battleships will be the largest in the United States navy and will carry a main battery of ten 14-in. guns.

The General Electric Co., Schenectady, N. Y., was the only bidder for the machinery of the battleships which will be constructed at the New York navy yard. The bid was $352,500.

The bids for the two colliers were beyond the appropriation and will be rejected.

Two Ocean Leviathans

THE Cunard Line has just invited Messrs. John Brown & Co., Ltd., of Clydebank, and Messrs. Swan, Hunter & Wigham Richardson, Ltd., Newcastle-on-Tyne, the builders respectively of the Lusitania and Mauretania, to send in tenders for the largest passenger vessel in the world. She is intended for the Liverpool-New York trade, and will be 885 ft. long by 95 ft. 6 in. broad, a gross tonnage of 50,000 tons, a speed of 23 knots, and will cost about $10,000,000. From these particulars it will be seen that she will be larger than the White Star liner Olympic, recently launched, in length by 2½ ft, in breadth by 3 ft. 6 in., in tonnage by 5,000 tons, and speed by 2 knots. The plans have been approved by Lloyds and the new Cunard lines will be propelled by turbines operating quadruple screws. In appearance she will resemble closely the present Cunard flyers, having four funnels and two pole masts. Her coal capacity will be 6,500 tons, but an important feature in connection with the design of the vessel is that her double bottom will be so arranged that she may carry oil fuel should the introduction of such a method of raising steam appeal to the owners as likely to be advisable. Needless to say, all the fittings throughout the vessel will be of the very finest description. There will of course be an installation of wireless telegraphy, also of submarine signaling. Turkish and electric baths will be among the luxuries provided. There will be a printing establishment for the issue of a daily paper, and also a swimming pond. A theater stage will also be fitted up in the first class lounge. The accommodation to be provided is as follows: First class passengers, 650; second class, 740; third class, 2,400, a total of 3,790, which compares with 2,500 in the Olympic and Titanic, and 2,200 in the Mauretania and Lusitania.

Interesting particulars are now available concerning the mammoth liner which is being built at the Vulcan yard at Stettin for the Hamburg-Amerika service. The vessel, which has not yet been named, has not been designed to create any new record, but in other respects it is claimed that she will be a new creation. Her length is 881 ft., and her gross tonnage 50,000. Her captain's bridge, when the liner is fully loaded, will be 77 ft. above the water line, and the flag at her masthead will be 208 ft. above the water, a fact which can best be appreciated when it is remembered that even the mainmast of the unlucky Preussen, the world's largest sailing ship, reaches a height of only 196 ft. Only a decade has elapsed since the Deutschland, a vessel which created an enormous sensation at the time, was put in commission, but the hull of the new liner is so enormous that the Deutschland could float within it as in a basin, even her funnels being hidden. The Deutschland is only 662 ft. in length, and her gross tonnage is only 16,500. The tonnage of what is at present the Hamburg-Amerika Co.'s largest liner, the Kaiserin Auguste Victoria, is 26,400, and that of the Cunard liner, Mauretania, 30,000, while the Olympic and Titanic, of the White Star line, are 45,000 tons each. The Hamburg-Amerika line has at present 168 ocean-going steamers in commission, with a gross tonnage in the aggregate of 979,217, which will be brought beyond the million when the new boat is launched. On her outward journey the liner will make Southampton her English port of call, and on the return journey from New York she will call at Plymouth. So soon as this new boat is launched work will be commenced upon the small fleet of sister ships.

Bids for Torpedo Boat Destroyers

The navy department opened bids, on Nov. 8, for the construction of six torpedo boat destroyers. The bids submitted were as follows: Fore River Ship Building Co., Quincy, Mass., one boat with Curtis turbines, $648,700; Bath Iron Works, Bath, Me., one boat on department's designs, $669,750, or two for $654,500 each; one boat with machinery, their own design, $655,500, or

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two at $630,500 each; New York Ship Building Co., Camden, N. J., one boat on department's designs, $645,000, or with Curtis turbines, $670,000; Union Iron Works, San Francisco, one boat with department's designs, $721,000, or two at $704,000 each, or the same bids obtain with speed reducing gear; Maryland Steel Co., Sparrow's Point, Md., two boats at $685,000 each, or with machinery of their own design at $742,000 each; Newport News Ship Building & Dry Dock Co., Newport News, Va., one on department's designs at $635,000; William Cramp & Sons Ship & Engine Building Co., Philadelphia, one on department's designs, at $658,000. The bids will be rejected as under the operation of the eight-hour law an additional appropriation would be required to meet the bids.

Arrival of Tug Miraflores

The tug Miraflores arrived in Panama Bay on the morning of Nov. 4, having made the trip up the west coast of South America from Valparaiso, Chile, in about 10 days, which was considerably better time than it made during the previous part of its voyage. It left the yards of Pusey & Jones, Wilmington, Del., on Aug. 12, the builders having made a contract for delivery at a stipulated price. The first stop was at Barbados, where the tug was in dry dock for eight days. It then continued on its voyage around South America, meeting with almost continuous rough weather until after it had passed through the Strait of Magellan. Stops were made at Barbados, Pernambuco, Montevideo, Sandy Point, Coronel and Callao. All but three members of the original crew deserted during the voyage, the vessel reaching its destination with 12 men, besides the captain and mate. The tug showed the effects of the rough voyage in its weather-beaten sides, while two or three panels in the deck house had been splintered by heavy seas. The breakwater at the bow, as shown in the photograph, was simply put on for the trip. Immediately after its arrival at Balboa, after the voyage of 13,000 miles, the Miraflores was given a speed trial and made 10 knots in 42 minutes.

The Miraflores is 118 ft. 6 in. over all, 23-ft. beam and 12-ft. 6-in. depth molded. The engine is triple-expansion, 13, 21 and 32-in. cylinder diameters by 24-in. stroke. The boiler is 14 ft. diameter, 12 ft. 6 in. long, with three furnaces, 46 in. diameter.

TUG MIRAFLORES OF THE ISTHMIAN CANAL COMMISSION'S FLEET.

Municipal Dock at Tacoma

At the November election the citizens of Tacoma authorized the city officials to issue bonds in the amount of $405,000 for the purchase of a site and the construction of a municipal dock on the city waterway and voted down the proposed issue for the purchase of a fire tug to protect its waterfront. The shipping men of the port fought hard for the latter measure, while they opposed the passage of the municipal dock measure which the city authorities were forwarding. They argued that the city should make some provision to protect its present docks and big lumber mills along the front before it placed any more buildings there. At present the waterfront is poorly protected, although tentative plans have been made to place a high pressure fire main system along the city waterway and the bay front.

The proposed dock is to be four stories high, 300 ft. long and 80 ft. in depth, and will be a reinforced concrete structure costing approximately $120,000. A wide viaduct will be built from Twelfth street to the upper story of the dock, which will allow teams to drive from the heart of the business district directly upon the dock to unload freight without encountering any grades or heavy hauls. The tentative plans provide for the installation of elevators which will take both freight and passengers from the fourth floor to the steamer landing.

Pacific Coast Casualties

The heavy gales off the north Pacific coast during November reaped a small harvest in wrecked steamers and sailing craft and seriously handicapped shipping for more than two weeks. The wooden steamer Portland, owned by the Alaska Coast Co., and one of the most famous vessels plying in the Alaska trade, was one of the victims, although she first grounded in a smooth sea. The Portland was bound from Tacoma and Seattle to Valdez when, at 6 a. m., Nov. 12, she struck an uncharted reef off Martin island. There was practically no sea at the time but, owing to the heavy fog, the ship had worked closer inshore than is customary in those waters. Excellent discipline prevailed and Capt. Moore beached her at the mouth of the Katalla river. Within an hour a heavy sea had sprung up and the passengers and mail had hardly been taken off before the ship began to break up. Attempts to take out her cargo failed and she is now practically a total wreck. First reports from the scene of the accident were to the effect that the passengers were suffering from famine, but this was later found to be erroneous, as the Portland was carrying a large stock of provisions north to the Alaska ports and the supplies were consequently ample.

The British steamer Sechelt met with her second mishap in three months when she hit the reefs off Bowen Island, about 40 miles from Vancouver, B. C., on Nov. 5. The passengers were taken off and part of her cargo salved. She will probably be a total loss. The steamer is owned by the Sechelt Steamship Co., of Vancouver.

Tug for Port of Portland

Bids will be advertised for about Jan. 1, 1911, for the construction of a steel sternwheel tug for the port of Portland commission. Plans and specifications are being drawn by Architect C. H. Norrlin, who designed the tug Oneonta, recently completed for the Port of Portland. The new stern-

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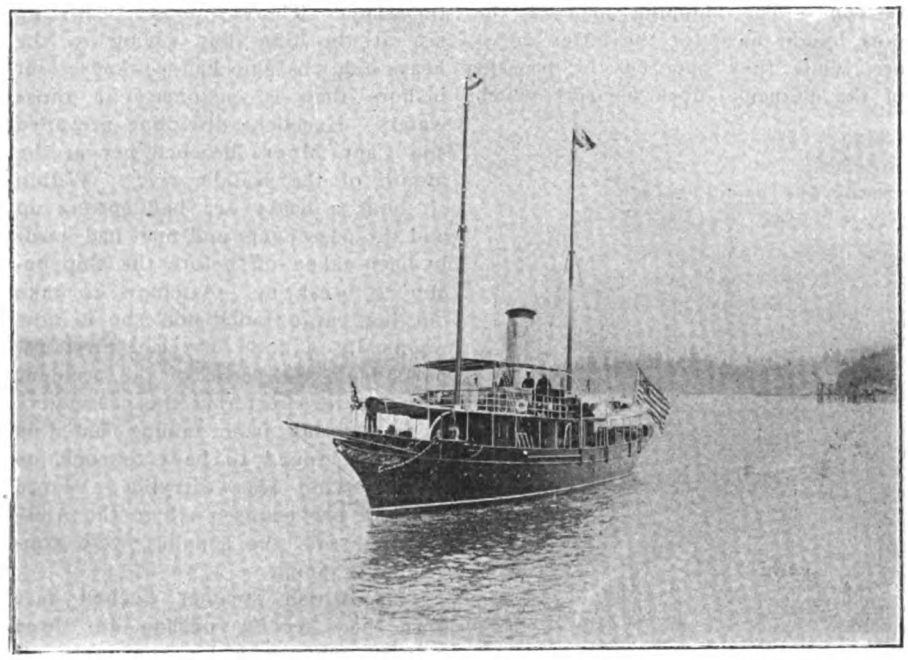
wheeler will be 180 ft. long, 34 ft. beam and have a draught of 9 ft. The hull will be of steel throughout, and the superstructure and stack will be low enough to pass under the draw bridges at low water. The new tug will have 1,800 horsepower and will be fitted with steam towing machine. Her cost is estimated at about $100,000, and it is expected she will be completed in time for the opening of the 1911-1912 grain service on the Columbia river. The Port of Portland at present has but one towboat that can be used for handling ships in the river.

Steam Yacht Aquilo

Aquilo, the fine steam yacht used by James A. Moore and Herbert T. Low, of the Western Steel Corporation, to take visitors to the steel plant at Irondale from Seattle, Vancouver and other Puget sound points, is a notable addition to the pleasure vessels of Puget sound. The Aquilo was built by George Lawler of East Boston, being



STEAM YACHT AQUILO.

brought around the Horn and delivered to her present owners in May, having made the trip in 62 steaming days. She is a steel, ocean-going yacht, 156 ft. over all, 22 ft. beam, and averages 15 knots an hour. Her engine is triple-expansion, 10¾, 17 and 27-in. cylinder diameter by 18-in. stroke, supplied by two vertical oil-burning water-tube Almy boilers. The boat is lighted throughout by electricity supplied by a 7-K. W. General Electric lighting plant generator, driven by a 5-in. x 4½-in. marine engine, at 550 revolutions per minute. The engine room is amidships with dining room and cabin forward, and staterooms and library aft, fitted to comfortably sleep eight guests. Three decks are the lower, main and bridge, with the navigating bridge and aft main deck covered with long canopies. Below decks the Aquilo is finished in blue and white with beamed ceiling and mahogany furniture.

Three New Steamers

Contracts will be awarded about the middle of this month by the Northwestern Fisheries Co., at Seattle, for the construction of three steamers to be used on the Sushitana river in Alaska. A number of the Portland and Puget sound ship builders are figuring on the plans. One of the vessels will be a single screw tug, 108 ft. in length over all, for use at the entrance of the river, and the other two will be used in the passenger and freight trade on the river. One will be 108 ft. in length and the other 110 ft. They will be stern wheelers, of light draught because of the shallow channel, and are to be equipped with tandem compound condensing engines.

Car Ferry Ann Arbor No. 5

Car ferry Ann Arbor No. 5, building for the Ann Arbor Railroad, was launched from the yard of the Toledo Ship Building Co., Toledo, on Nov. 26, being christened by Miss Katherine Holliday, daughter of W. D. Holliday, assistant to the president of the Ann Arbor Railroad. The new car ferry is 378 ft. over all, 350 ft. keel, 56 ft. beam and 21 ft. deep. Her machinery consists of two triple expansion engines, cylinders 21, 33 and 52 in. diameter by 40 in. stroke, allowed 185 lbs. pressure and designed for 100 revolutions per minute. She has four Scotch boilers, 13 ft. 6 in. diameter and 12 ft. long, each containing two 50 in. Morrison suspension furnaces, fitted with heated forced draft. She has four tracks and will carry 28 freight cars of the largest size or 32 of ordinary length. The hull is designed for ice breaking purposes. It is interesting to note that a hinged gate has been fitted at the stern 5 ft. 6 in. high.

The electric light plant consists of two 15-kilowatt General Electric Co.'s generators, the wiring carried in metal conduit below the spar deck. The vessel is wired for about 550 lamps and is equipped with one 19 in. search light, hand operated on top of the pilot house, and one 19 in. dispersion lens on the stern.

Mr. Goulder's New Firm

Mr. Harvey D. Goulder has sent out an announcement regarding the personnel of his law firm, which has been undergoing reorganization lately. The firm now includes William W. White, who has been associated with Mr. Goulder for the past nine years; Luther Day, son of Hon. William R. Day, of the United States supreme court, who has been engaged in general practice in Canton; Thomas H. Garry, who resigned the position of assistant United States attorney for the northern district of Ohio; O. D. Duncan, graduate of the naval academy at Annapolis, who, for some years, has been in admiralty practice in New York City; and Robert McCreary, who has been with Mr. Goulder for several years.

William McKie, East Boston, Mass., is to build two steamers for the Boothbay section of the Eastern Steamship Co., to be 120 ft. long, 20 ft. beam, and 8 ft. deep. The Atlantic works, East Boston, will supply the engines.

Lloyds returns indicate that, exclusive of warships, there were 368 vessels of 1,154,197 tons gross under construction in Great Britain at the close of the last quarter. The tonnage now under construction is about 36.000 tons more than that which was in hand at the end of last quarter and exceeds by 376,000 tons the total building 12 months ago.

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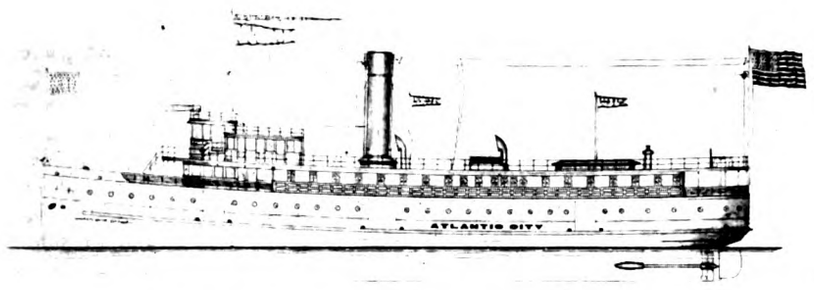
Steamer for Atlantic City Transportation Co.

M. C. Furstenau, naval architect of Philadelphia, has designed for the Atlantic City Transportation Co., Atlantic City, N. J., a small freight and passenger steamer for service between Atlantic City and New York. Her principal dimensions are as follows: 195 ft. 6 in. over all, 185 ft. between perpendiculars, 28 ft. 6 in. breadth molded, 37 ft. 6 in. breadth over guards, 13 ft. 6 in. depth over lowest point of sheer.

The hull will be constructed entirely of steel up to the promenade deck. The arrangement of the hold space



PROFILE OF STEAMER FOR THE ATLANTIC CITY TRANSPORTATION CO.

will be as follows: Collision compartment; cold storage compartment, boiler room; engine room; buffet; galley, and crew's quarters. The main deck will be arranged for general cargo. On port and starboard sides abreast of the engine room will be located the crew's quarters and wash room and after this will be the social hall and dining room, which will be finished in mahogany. The staterooms and general saloon will be on the promenade deck and will be finished in white pine with mahogany trimming.

The propelling machinery will consist of two 3-crank, triple-expansion engines with cylinders 14¼, 23¼ and 36 in. diameters by 26 in. stroke, supplied with steam from two water-tube boilers.

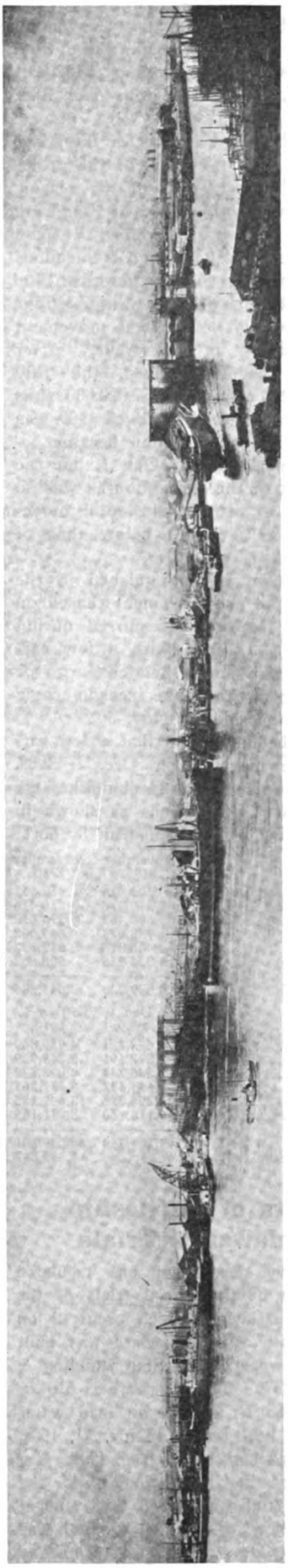
Proposals for building this steamer were opened on Sept. 27, the bid of the Harlan & Hollingsworth Corporation, Wilmington, Del., at $165,000 being the lowest. Contract, however, has not yet been awarded.

Contracts for Lake Steamers

An excellent shipbuilding program is being lined up for lake ship yards this winter, notwithstanding the apparent surplus of vessel tonnage on the lakes. The Pittsburg Steamship Co. has been authorized by the United States Steel Corporation to build two 600-foot steamers for 1911 delivery. They will be built on the Isherwood system, though contracts have not yet been let. The Jones & Laughlin Steel Co. will build a 600-footer to replace the W. C. Moreland, wrecked on Eagle river, Lake Superior. She will be a duplicate of the Moreland, and will be built by the American Ship Building Co. The interests of which William P. Snyder, of Pittsburg, is the head, will shortly invite proposals for two of the largest vessels on the lakes, to be 615 feet over all and to be constructed on the new longitudinal system. They will also be somewhat of a departure in that the side tanks will be carried to the spar deck and that the cargo bulkheads instead of being carried straight from the spar deck to the tank top, as is the usual practice, will be so carried for only half the distance, and will then slope to the tank top in both fore and aft directions, describing an inverted V with a reach of about 10 ft. thus making the hopper construction athwartships as well as fore and aft. This formation of bulkhead will naturally further tend to the concentration of the cargo, a desirable feature in unloading. Moreover it is understood that all the auxiliary machinery is to be turbine-driven. While bids will be solicited for two steamers the two, however, may not be built at once.

The American Ship Building Co. has secured contract from the Standard Oil Co. for the construction of a steamer and barge to carry oil in bulk. They will be of Canadian canal dimensions, 260 ft. over all, 250 ft. keel, 43 ft. beam and 23 ft. deep. It is interesting to note that the steamer will be fitted for burning oil fuel. Both vessels will be built at the Cleveland yard.

The Niagara, St. Catherines & Toronto Navigation Co., St. Catherines, Ont., has given contract to the Collingwood Ship Building Co. for a new steamer for service between Port Dalhousie and Toronto. The new steamer will be 200 ft. long and will be designed to carry about 1,000 passengers and 300 tons of freight.



A WONDERFUL PHOTOGRAPH.

Photograph by Frank & Sons, South Shields.

Three-quarters of a mile of river frontage: the shipyards, engine works, and dry docks of Messrs. Swan, Hunter, & Wigham Richardson, Ltd. at Walker and Wallsend-on-Tyne, England. Viewed from left to right are seen successively the S. S. Sidi Brahim passenger steamer for the Transports Maritimes of Marseilles; the S. S. Carthage, 19½ knot mail steamer for the Cie Generale Transatlantique; the Neptune Engine Works; the 150-ton floating crane; ships building under the overhead electric cranes; the Dry Docks Department with two floating Docks and the Cairn Line S. S. Tortona in the graving dock; the great glass-roofed building sheds where the Mauretania was built and from which the Cunard Co.'s S. S. Franconia is being launched; the bottom plating of the British Admiralty floating dock to lift 32,000 tons; the east yard glass-roofed building sheds and the Indra Line S. S. Indrabarah alongside.

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Ore Shipments

Ore shipments during November were 2,641,886 tons, making the total shipments for the season 42,620,201 tons, a gain of 936,328 tons over 1909, when 41,683,873 tons were moved. This establishes a record for the lakes, though it falls far short of the promises of the early part of the season. When navigation opened in the spring of 1910 the ore movement began with a rush and kept up a tremendous clip during the summer months. The movement during June was 7,316,592 tons, which is the highest movement ever achieved in the trade. After that the pace slackened, the July movement being under 7,000,000 tons and thereafter the record of 1909 was not equalled. The slump became especially marked after Oct. 1, but the movement of the early months was so heavy as to prevent the total movement of 1910 falling below that of 1909.

The season is distinguished in the fact that the ore movement ceased on Nov. 30. No ore was moved during December. In fact, with a few cargoes of grain and a belated cargo or two of coal, the lake season came to an abrupt end on Nov. 30.

It will be understood that a few cargoes were moved after Dec. 1, 1909, which, of course, slightly diminishes the increase of 1,455,842 tons as shown in the following table of shipment by port:

Port.	November 1909.	November 1910.
Escanaba	701,646	452,351
Marquette	369,478	250 426
Ashland	600,469	276,612
Superior	758,073	635,002
Duluth	1,446,288	519,893
Two Harbors	1,023,266	508,062
	4,899,220	2,641,886

Port.	To Dec. 1, 1909.	To Dec. 1, 1910.
Escanaba	5,632,421	4,959,869
Marquette	2,877.191	3,248,929
Ashland	3,736,744	4,093,822
Superior	6,505,527	8,437,261
Duluth	13.296,326	13.609,155
Two Harbors	9,116,150	8,271,165
	41,164,359	42.620,201
1910 increase		1,455,842

Data of Battleship Delaware's Trials

The navy department has tabulated the results of the official trials of the battleship Delaware which occurred on Aug. 6, last. The Delaware was built by the Newport News Ship Building & Dry Dock Co. The Delaware is 510 ft. long and 85 ft. 2½ in. on load water line. Her keel was laid Nov. 11, 1907, and she was launched Feb. 6, 1909. Her displacement at the beginning of the four-hour trial was 20,863 tons and at the conclusion of the 24-hour trial was 20,190 tons. Her speed on the four-hour run was 21.46 knots and on the 24-hour 19-knot run was 19.68. The steam engineering data for these runs is as follows:

FOUR-HOUR FINAL TRIAL.		24-HOUR FINAL TRIAL.	
Average speed, knots	21.46	Average speed, knots	19.68
Average R. P. M.	127.6	Average R. P. M.	111.76
Average I. H. P.	27,264	Average I. H. P.	18,722
Average coal per hour per I. H. P., all purposes	1.87	Average coal per hour per I. H. P., main engines	1.51
Average steam pressure at engine (gage)	248.5	Average steam pressure at engine (gage)	210.5
Average vacuum	24.7	Average vacuum	25.45
Average temp. injection	71.5	Average temp. injection	74.5
Average temp. discharge	114	Average temp. discharge	110
Average temp. feed water	226.5	Average temp. feed water	215
Average revs. forced draft blowers	759	Average revs. force draft blowers	650

STEAM CONSUMPTION.

	Knots.	Lb.	Knots.	Lb.	Knots.	Lb.
Water per I. H. P. per hour, main engines only	12	15.48	19	12.7	21	12.9
Water per I. H. P. per hour, all purposes	12.24	21.05	19.225	14.52	21.563	14.8
Total water per hour, all purposes	12.24	83,413	19.225	250,549°	21.563	422,931
Total water per hour, for main engines only	12	55,000	19	205,000	21	312,000

° Includes about 7,500 lb. of make-up feed.

State of Industry

General business throughout the country is only fair, according to a canvass of the 3,000 members of the National Association of Manufacturers, which has just been completed by that organization. About 2,000 answers were received in reply to the set of questions presented to each member by the officers of the association and a tabulated statement of the individual replies, properly classified, is given in the current issue of the American Industries, the official organ of the National Association of Manufacturers. Each member of the association was asked to state how he estimated the improvement in sales and collections the past twelve months, what he considered to be the present state of trade conditions and what was the outlook for next year.

"There is no calamity in sight, nothing so menacing that people need be unduly alarmed, but conditions are unsatisfactory, and they can and should be improved," says H. H. Lewis, secretary of the association, in summing up the result. Mr. Lewis says that, while some industries are really prosperous, the average is below normal. He attributed three reasons for this condition, namely, national irritation, speculation and internal dissension.

SUMMARY OF NAVAL CONSTRUCTION.

Name of Vessel.	Building at.	1910: Per cent of completion. Sept. 1.	Oct. 1.
BATTLESHIPS.			
Florida	Navy Yard, New York	74.2	77.4
Utah	New York S. B. Co.	85.5	88.0
Wyoming	Wm. Cramp & Sons	35.5	38.9
Arkansas	New York S. B. Co.	43.9	47.8
TORPEDO BOAT DESTROYERS.			
Paulding	Bath Iron Works		*
Drayton	Bath Iron Works	91.7	94.4
Roe	Newport News S. B. Co.	99.3	100.0**
Terry	Newport News S. B. Co.	93.5	99.0
Perkins	Fore River S. B. Co.	93.8	97.4
Sterett	Fore River S. B. Co.	89.8	90.8
McCall	New York S. B. Co.	95.5	95.9
Burrows	New York S. B. Co.	92.7	94.9
Warrington	Wm. Cramp & Sons	81.4	84.7
Mayrant	Wm. Cramp & Sons	82.0	83.7
Monaghan	Newport News S. B. Co.	31.3	35.6
Trippe	Bath Iron Works	62.6	68.3
Walke	Fore River S. B. Co.	52.8	57.5
Ammen	New York S. B. Co.	65.4	72.4
Patterson	Wm. Cramp & Sons	44.6	47.8
SUBMARINE TORPEDO BOATS.			
Carp	Union Iron Works	62.0	63.0
Barracuda	Union Iron Works	62.7	64.8
Pickerel	The Moran Co.	58.1	61.1
Skate	The Moran Co.	58.1	61.1
Skipjack	Fore River S. B. Co.	54.0	56.3
Sturgeon	Fore River S. B. Co.	52.5	55.4
Thrasher	Wm. Cramp & Sons	10.8	15.7
Tuna	Newport News S. B. Co.	31.8	32.4
Seal	Newport News S. B. Co.	54.4	55.9
No. 28	Union Iron Works		No report.
No. 29	Union Iron Works		No report.
No. 30	The Moran Co.		No report.
No. 31			No report.
COLLIERS.			
Cyclops	Wm. Cramp & Sons	89.9	98.4
Neptune	Maryland Steel Co.	43.2	47.8

*Delivered Portsmouth yard, Sept. 27, 1910.
**Delivered Norfolk yard, Sept. 15, 1910.

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BEST, U. S. NAVY and NAVY

BOTH

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ALSO

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Is equipped to overhaul your tarpaulins, weather cloths, etc., with dispatch and satisfaction to yourself.

OUR RIGGING LOFT

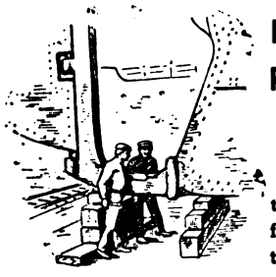
Will be glad to look after your mooring lines, wheel ropes, rigging, etc.

These things should be looked after at once, before the crew leaves for the Winter, for if left until Spring, when everything is hustle and bustle, your boat may be delayed.

Send in now, whatever needs overhauling, and we can take more care to put it in first class shape. We will be glad to hold it over Winter and ship back to the boat when she is fitting out next Spring.

THE UPSON-WALTON CO.

CLEVELAND, O.



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The Thermit Process enables you to weld broken sternposts, rudder frames, shafts, etc., without removing them from the vessel. All of our appliances are portable and may be brought to the job. No outside power is required with the exception of a small supply of compressed air.

Thermit is a mixture of finely divided aluminum and iron oxide which burns up and produces liquid steel at a temperature of 5,400° F. This is poured into a mould surrounding the broken sections and the intense heat of the Thermit steel causes it to dissolve the metal with which it comes in contact amalgamating with it to form a homogeneous mass when cool.

Pamphlet No. 20-E tells all about it. Write for a copy and for "Reactions", the Thermit Quarterly.

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INSURANCE

HULLS and CARGOES

DIRECT REPRESENTATIVE OF LEADING AMERICAN AND FOREIGN UNDERWRITERS

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The national irritation, he believes arises mainly from political agitation. He especially urges that the tariff question be taken out of politics.

"The problem must be settled," he says, "and our business interests are becoming unanimous in realizing that the only practical and satisfactory solution is the tariff commission form of investigation. In passing it may well be understood nowhere is the need of an independent tariff commission more clearly recognized than among the manufacturers who are popularly supposed to be the actual beneficiaries of high protection."

Rust and Scale Remover

With establishments handling structural shapes, plates, etc., the problem of removing scale and rust from the pieces before fabricating is a serious one, both as regards expense and time.

Where the raw material is unloaded and stocked in a storage yard and cut to size before it goes into the shop, scraping, brushing with wire brushes, emery grinders, sand blast,

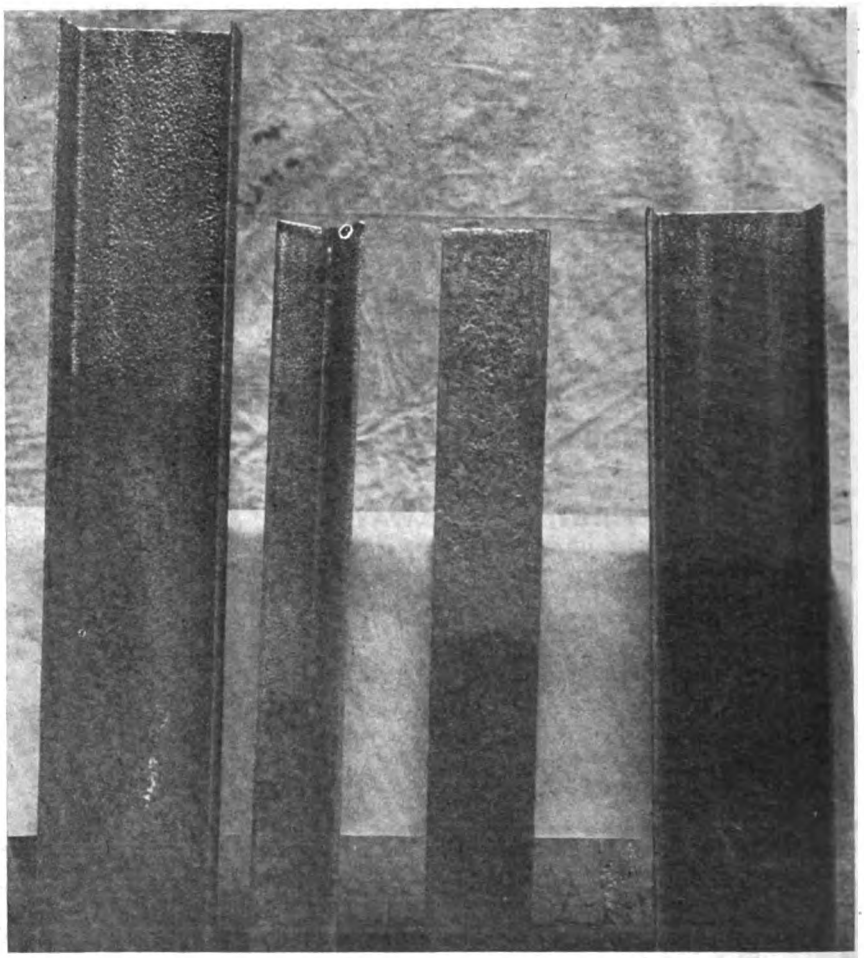
REMOVING RUST AND SCALE FROM STRUCTURAL MATERIAL WITH THE B. H. ROTARY CLEANER.

etc., have all been tried and all have been found to have serious defects, being either too expensive, too slow, ineffective, inconvenient, or otherwise undesirable. The Brown Hoisting Machinery Co., Cleveland, have developed a tool in their own works which is said to entirely eliminate the faults of these other methods, and after a thorough test on actual work it has given such excellent results that it has been patented and is now being placed on the market under the name of the B. H. Rotary Cleaner.

The B. H. rotary cleaner, as will be noted from the illustrations herewith, consist of two disks on the same hub carrying at their perimeters a series of pins on which are loosely mounted steel blades or cutters. These blades are rectangular in shape and the hole by which they are supported on the pin is elongated, so that in revolving they have a maximum efficiency.

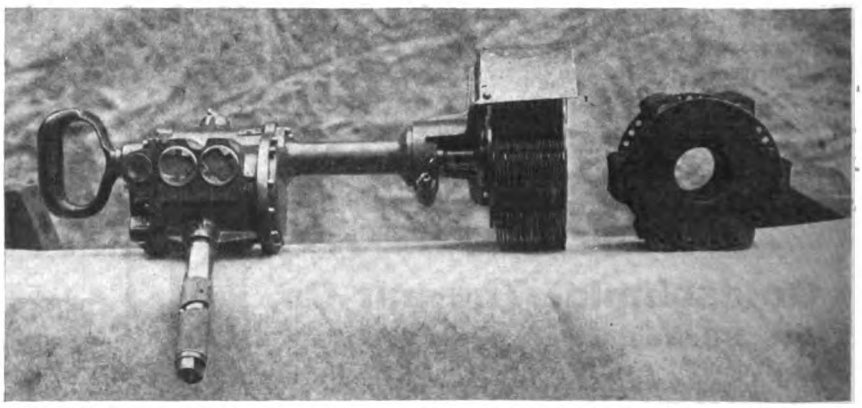
This tool is attached to and driven by a high-speed pneumatic or electric grinder. Its effectiveness is due to the chipping action of the rapidly revolving blades, which accounts for its remarkable efficiency in removing scale and rust from structural material. It is simple in design, has interchangeable parts and is free from jar.

It is claimed that one man with a B. H. rotary cleaner can do the work of eight or ten men with scrapers or brushes and at the same time get better results. Other uses for the B. H. rotary cleaner, such as cleaning castings, surfacing stones, cleaning bottoms of ships, etc., will readily suggest themselves.



STRUCTURAL STEEL BEFORE AND AFTER CLEANING WITH THE B. H. ROTARY CLEANER.

The steamer Riker's Island, built for the department of correction of New York City, by the Waters-Colver Co. of West New Brighton, Staten Island, underwent a satisfactory trial trip on Nov. 21. This steamer was designed by M. C. Furstenau, naval architect of Philadelphia.



B. H. ROTARY CLEANER ATTACHED TO A PNEUMATIC HIGH-SPEED GRINDER.

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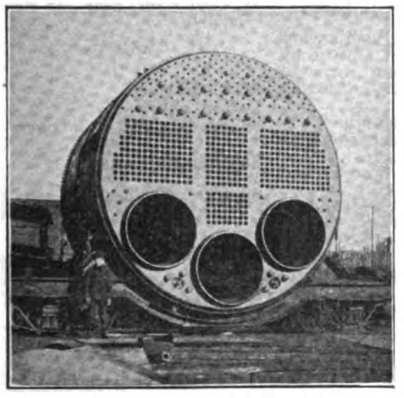

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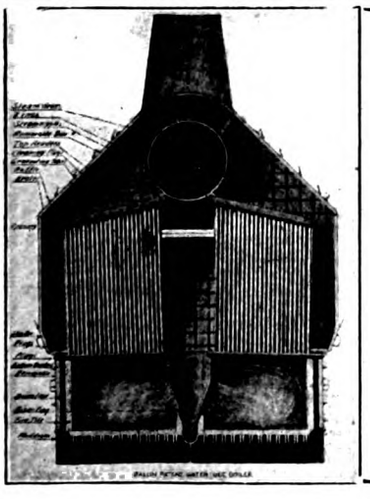

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All Generating Tubes and Headers seamless drawn steel tubes

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SIMPLICITY OF CONSTRUCTION
Terminals of tubes expanded in place
Every Tube or Header can be Inspected and Cleaned
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Perfect Combustion — Light Weight — Greatest Efficiency

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LAKE VESSEL ACCIDENTS FROM OCT. 6 TO CLOSE OF NAVIGATION

DATE.	NAME OF VESSEL.	NATURE OF ACCIDENT.	LOCATION.
Oct. 6	Tug Wm. Kennedy	Got line in her wheel and was towed to dock by tug John M. Truby	Cleveland harbor.
		Stuck across channel, blockading traffic; released Oct. 7	Cuyahoga river.
Oct. 6	Str. Turret Court	Ran aground; released on 8th, after lightering 150 tons of ore,	
Oct. 7	Str. Martin Mullen	uninjured	Outside of Huron harbor.
	Str. J. A. McGean	Struck at entrance to harbor; docked at Lorain	Indiana harbor.
		Struck while entering; damage unknown	Buffalo harbor.
Oct. 8	Str. North Sea	Ran into a reef; washed off by heavy seas on 9th and proceeded	
Oct. 8	Str. Sacramento	to Houghton; only slightly injured	Off Big Bay Pt., Lake Superior.
Oct. 9	Str. Roumania	Lost her rudder; drifted about all day; tugs unable to assist her, owing to heavy sea; towed back to Cleveland, where she unloaded her coal cargo and was docked	Lake Erie, off Gordon Park.
Oct. 9	Str. Glenmount	Ran ashore in wind storm	Pipe Island, Lake Huron.
Oct. 13	Str. Martin Mullen	Collided with str. James H. Reed in thick weather; bow smashed in and both anchors lost; beached; released on 14th and taken to Detroit for temporary repairs; docked at Superior, Oct. 22	St. Clair river, near Joe Bedore's landing.
Oct. 13	Str. James H. Reed	Collided with str. Martin Mullen; damaged on port side, one anchor lost; leaked; No. 1 tank leaked; air compressor put aboard by wreckers on 14th and taken to Detroit; towed from there to Lorain, where she was docked	St. Clair river.
Oct. 14	Str. C. C. Hand	Lost her rudder; towed to Toledo by tugs	Detroit river.
Oct. 15	Str. J. S. Ashley	Ran aground in thick weather; released later in day, uninjured	Squaw Isl., St. Clair river.
	Str. J. G. Munro	Collided with str. Peter White; six plates damaged and hawse pipe broken; damage about $5,000	Superior ship canal.
	Str. Peter White	Collided with str. J. G. Munro; four plates and ten frames damaged; loss about $5,000	Superior ship canal.
Oct. 18	Str. W. C. Moreland	Ran on rocks; wreckers ordered to her immediately, but owing to severe weather, could work on her only four days out of 14; abandoned by owners as constructive total loss on Nov. 2; steamer practically broken into three parts; loss to underwriters about $500,000; largest vessel ever lost on the lakes	Eagle river, Lake Superior.
Oct. 21	Str. J. W. Westcott	Stranded; part of lumber cargo thrown overboard; released on 24th	Sister Isl. Shoal, Green Bay.
Oct. 21	Str. B. F. Berry	Got stuck in Erie railroad draw and had to be towed back to C. & P. dock to lighter; docked at Lorain Nov. 5; eight plates damaged	Cleveland.
Oct. 22	Str. Sinaloa	Ran aground on sand bar while entering harbor in wind storm; released on 27th, after pulling on her continuously for four days and lightering 55,000 bu. grain; not injured	Buffalo harbor.
Oct. 22	Str. Arlington	Became disabled in heavy sea; picked up by str. Utley and towed to Milwaukee; cylinder head broke	Lake Michigan.
Oct. 22	Str. Lycoming	Destroyed by fire; wreck sank in 17 ft. of water	Rondeau, Lake Erie.
Oct. 23	Str. Langham	Burned to water's edge and sank in 120 ft. of water; total loss; loaded with coal; insurance, $45,000	Off Keweenaw Pt., Lake Superior.
Oct. 24	Str. Choctaw	Collided with str. America while lying at Kemp's coal dock; three plates damaged; temporarily repaired	Soo river.
Oct. 24	Str. America	Collided with str. Choctaw; arrived in Cleveland Oct. 27 and went into dry dock	Soo river.
Oct. 25	Str. City of Berlin	Towed into Sturgeon Bay, disabled, as result of blowing out of her boiler head; one fireman fatally burned; towed to Manitowoc for repairs	Lake Michigan.
Oct. 26	Mud scow	Collided with str. Sierra and sank immediately. Crew escaped	Buffalo.
	Str. Helen C.	Stranded on rocks; bottom damaged; released on 27th, after lightering 100,000 ft. of lumber; docked for repairs	Vessel Point, near Sault.
Oct. 28	Bge. S. D. Warriner	Struck; released after lightering 500 tons of ore cargo; leaked; towed to Cleveland and was docked Nov. 2; 26 damaged plates	Ballard's Reef, Detroit river.
	Str. Turret Chief	Ran ashore; forward tank leaked; docked at Collingwood	Tombstone Isl., Georgian Bay.
Oct. 29	Str. Republic	Ran aground at north entrance; floated on 30th by the tide; number of damaged plates; repaired at Buffalo	Buffalo harbor.
Oct. 29	Str. Glenmount	Arrived at Montreal in badly damaged condition as result of encountering storm	Lake Erie.
Oct. 29	Str. Advance	Machinery became disabled; towed to Sault by tug Thompson and repaired before proceeding	Whitefish Bay.
Oct. 29	Str. Manitou	Collided with str. Venezuela; forward works and bow damaged; repaired at Hickler's ship yard; Venezuela not injured	Off Pt. Iroquois, Upper St. Mary's river.
Nov. 2	Str. C. W. Kotcher	Stranded, almost completely blocking channel; Nos. 34 and 5 compartments full of water; two air compressors put aboard; released on the 3d, after lightering 1,200 tons of coal cargo; docked Nov. 13 at Milwaukee, repairs will cost about $40,000; 60 damaged plates, 23 of which must be replaced with new ones	Limekiln Crossing, Detroit river.
Nov. 2	Str. Binghamton	Collided with str. Rochester; slightly damaged	Buffalo harbor.
Nov. 2	Str. Rochester	Collided with str. Binghamton; slightly damaged	Buffalo harbor.
Nov. 4	Derrick scow	Sank during night while lying at dock; scow overturned and boiler fell to bottom of river; boat will be floated	Lorain.
Nov. 4	Str. B. F. Berry	Struck Erie avenue bridge; railing and walk of bridge considerably damaged; steamer not injured	Lorain.
Nov. 5	Sand sucker	Hit by str. Northern Queen; crushed against dock and rent almost her entire length; listed and turned turtle; vessel and cargo valued at $6,000; crew scaped	Blackwell canal.
Nov. 5	Str. Northern Queen	Collided with str. West Shore; not seriously damaged	Blackwell canal.
Nov. 5	Str. West Shore	Collided with str. Northern Queen; after part of steamer badly damaged	Blackwell canal.
Nov. 5	Str. R. L. Ireland	Ran aground at foot of Jefferson avenue; released on 6th	Toledo.
	Str. J. H. Sheadle	Ran aground; docked at Ecorse, Nov. 6	Soo river.
Nov. 6	P'k'g. f'r't'r. Wasoga	Burned; total loss; vessel valued at $30,000, cargo at $56,000	Copper harbor, Lake Superior.
Nov. 7	Schr. Bottsford	Struck Central viaduct; lost her foremast	Cleveland.
Nov. 8	D. O. Mills	Grounded; released, uninjured	Off Harmon Park, Lake Erie.
———	Str. M. A. Hanna	Struck an obstruction, breaking two buckets off her wheel; left Sault Nov. 9 after completing repairs	Mud lake.
Nov. 8	Str. Carleton	Ran ashore; released by tugs, uninjured	Near Port Dalhousie.
Nov. 10	Str. D. R. Hanna	While coming out broke away from tugs and ran on beach near entrance; released Nov. 13, uninjured	Indiana Harbor.
Nov. 11	Str. Powell Stackhouse	Ran aground; released Nov. 12, uninjured	Near Amherstburg, Detroit river.
Nov. 11	Pkg. frtr. Northern Queen	Cracked two plates; to be repaired at Superior	Duluth.
———	Str. Panther	Ran ashore and filled with water; after futile efforts to release her, abandoned for the winter; work on her to be resumed in spring	Grand Island, Lake Michigan.

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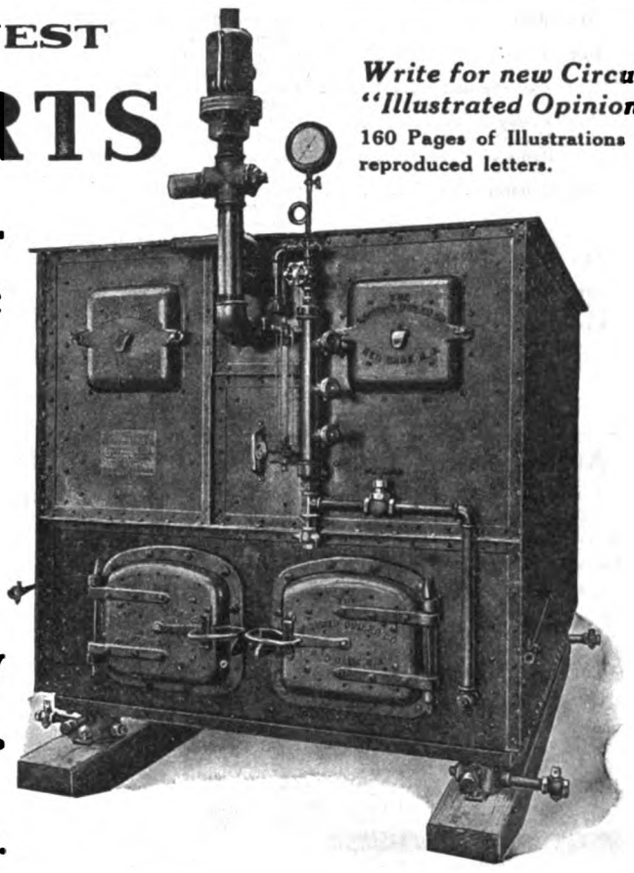

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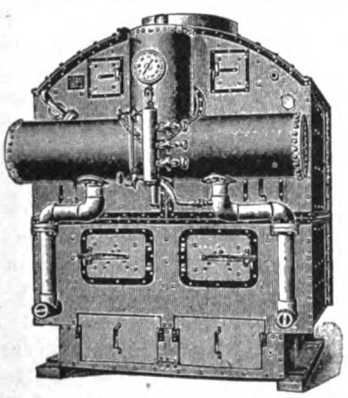

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Almy Water-Tube Boiler Co. PROVIDENCE R.I., U.S.A.

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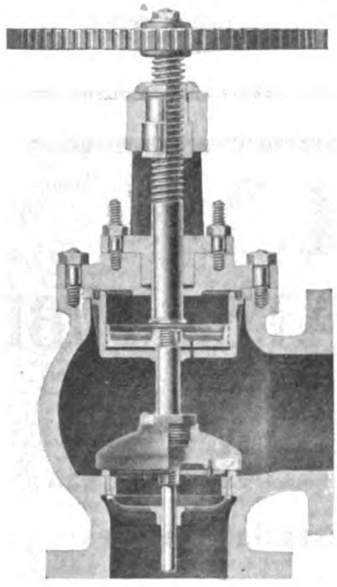
DATE.	NAME OF VESSEL.	NATURE OF ACCIDENT.	LOCATION.
Nov. 21	Str. Australia	Hit the dock while winding and broke her quadrant; repairs completed Nov. 25	Ashtabula.
Nov. 25	Bge. Sligo	In putting in for shelter, barge missed pier, let go her anchor, and went on the beach; crew remained aboard	Cobourg, Ont.
Nov. 25	Fish tug Dispatch	Picked up in disabled condition by car ferry Marquette and Bessemer No. 2 and towed to Port Burwell	Lake Erie.
Nov. 26	Str. Viking	Lost her rudder	Lake Michigan.
Nov. 27	Str. Alaska	Totally destroyed by fire while lying at Tobermoray for shelt r	Tobermoray, Lake Huron.
Nov. 29	Str. Pollock	Ran ashore in snow storm; out 6 in.; released Dec. 1 and proceeded on trip	St. Martin's Reef, St. Mary's river.
Nov. 30	Tug General	Sunk in collision with Canadian str. Athabasca; three members of crew drowned; hit on port side abreast of engine room and almost cut in two; sank almost instantly in 55 ft. of water; total loss, valued at $25,000; not insured	Sault river.
Nov. 30	Str. Smith Thompson	Ran aground in snow storm; out about 7 in. forward; released Dec. 1, uninjured	Detroit river.
Nov. 30	Str. Onoko	Ran ashore in snow storm; out 2 ft. forward and 1 ft. aft; released Dec. 2, after lightering part of cargo; not damaged	Pt. Au Pelee, Lake Erie.
Dec. 4	Car ferry Marquette and Bessemer No. 1	While loading, several empty cars broke loose and tipped stern of boat, breaking coupling which connects apron to ferry and demolishing apron; several loaded cars on upper deck broke loose, their weight moving boat away from dock; four loaded cars dropped into creek, while two others are hanging over her stern.	Conneaut.

New Automatic Stop and Check Valve

A new type of valve for heavy pressure and which is designed to automatically shut off the flow of steam from the header to a boiler in case of rupture of a tube or other part, thereby suddenly reducing the pressure in the boiler, has been brought out by Jenkins Bros., 71 John street, New York. These valves also equalize the pressure between the different



boilers in a battery. As they can only be opened by the pressure in the boiler to which they are attached, it is impossible to accidentally turn the steam into a boiler which is being cleaned. The valves are cushioned to prevent chattering, by an internal dashpot made of bronze which eliminates the danger of sticking through the corrosion of dashpot or piston. Care is urged that the valves be installed in a vertical position only. The metal throughout is the best quality of cast iron with steam metal mountings and each valve is given a factory test of 800 lbs. as hydraulic pressure.

Ship Building During November

The bureau of Navigation reports 70 sail and steam vessels of 16,349 gross tons were built in the United States and officially numbered during the month of November, 1910, as follows:

	Wood. Sail.		Wood. Steam.		Steel. Steam.		Total.	
	No.	Gross.	No.	Gross.	No.	Gross.	No.	Gross.
Atlantic and gulf	5	139	25	1,291	3	6,355	33	7,785
Pacific	2	67	11	151	..	.....	13	218
Great lakes	..	...	6	90	3	7,760	9	7,850
Western rivers	..	...	15	496	..	.....	15	496
Total	7	206	57	2,028	6	14,115	70	16,349

Some Old Vessels

Among the vessels still on the register of the Danish government are some examples of ancient construction including the following: The Constance, 27 tons, 1723; Marie, 34 tons, 1776; Erik Hansen, 49 tons, 1786; Twende Brodre, 74 tons, 1786; Defire Brodre, 14 tons, 1794; Albertine, 68 tons, 1794; Thora Johanne, 34 tons, 1807; Ebenezer, 20 tons, 1810. These vessels are in active trading on the Baltic and some of them regularly cross the North Sea with all kinds of cargoes including granite and other heavy goods. It would be of interest to know whether there are vessels actually older than these in active service.

Personal

John Haug, consulting engineer and naval architect, has opened an office at No. 24 California street, San Francisco, Cal. Mr. Haug's experience has been very extensive. For twenty years he was ship and engine surveyor for Lloyds Register at Philadelphia, furnishing designs for the Red "D" Line of steamships, the New York & Porto Rico Steamship Co., the Chesapeake Steamship Co., of Baltimore, and the Standard Oil Co., of New York. For the past five years he has been engineer-in-chief of the marine department of the Standard Oil Co. of California.

Items of General Interest

H. S. Fitz Gibbon has been appointed general manager of the New Jersey Asbestos Co., New York.

Alexander Sang, Duluth, Minn., was the lowest bidder for building pierhead crib and riprap embankment at Ashland, Wis. His bid was $7,874.25.

The Great Lakes Dredge & Dock Co., Chicago, was the lowest bidder for building the part rubble mound breakwater at Superior Entry, Wis. Its bid was $145,200.

The Revere Rubber Co., of Boston, has been awarded contract by the United States government for supplying the suction hose to be used in raising the battleship Maine in Havana harbor.

The National Rivers and Harbors Congress opened its seventh convention at the New Willard hotel, Washington, D. C., Dec. 7, 8 and 9. The congress is pledged to a waterway policy and not to a waterway project.

The 1911 edition of the Record of American and Foreign Shipping, published by the American Bureau of Shipping, is now ready for distribution. The rules have been revised and rearranged in the new issue and complete new rules for lake freight vessels have been compiled and are published for the first time in the new edition. Mr. Alexander Hynd is the representative on the lakes for the Bureau, to whom all orders for the edition should be sent.

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Pillsbury											
Roberts											29,319
Rust			4,648	37,655			25,828				68,131
Sauntry-Alpena	191,330	195,573	126,829	234,713	204,286	224,665	145,132	239,554	253,448	296,170	3,662,127
Scranton		6,642	3,327								1,123,071
Sellers									13,131		14,172
Seville											79,652
Sharon	25,247	55,802	75,037	67,051	118,048	84,223	76,461	129,079	166,894	177,863	1,271,761
Shenango	61,022	342,978	398,298	400,845	418,044	254,658	311,479	253,377	221,096	309,917	5,932,421
Sliver	140,312	137,085	130,126	104,604	157,646	155,415	124,506	150,699	177,220	170,554	6,193,471
Sparta	24,464	4,613	51,303	54,181	50,041	55,593	68,134	86,129	89,563	35,156	688,455
Spring			22,585	22,815	24,574	6,786		28,766		49,204	578,916
Spruce (Cloquet)		6,716	15,987								204,649
St. Clair											39,869
St. Paul										6,305	122,968
Stephens		29,983	47,578		32,736	7,395	71,870	106,281	38,544	10,022	1,419,197
Stevenson											65,341
Susquehanna			20,797								34,905
Sweeney	122,592	171,318	148,945	109	129,496	72,433					1,912,022
Syracuse											5,537,143
Tener											
Troy	3,125,039	3,757,010	3,457,522	3,245,346	3,868,025	3,040,245	2,843,703	4,215,572	4,057,187	4,388,073	91,903,991
Union											
Utica											
Victoria	715,919	808,359	644,801	627,379	645,786	460,548	422,162	365,739	318,990	245,684	9,537,378
Virginia (Group)	123,183	339,897	450,794	678,310	673,863	596,735	505,432	653,682	766,853	830,700	6,991,297
Wacoutah		81,022	170,446	212,008	243,937	169,616	74,866	91,775	106,933	43,320	1,359,611
Webb		5,169	4,670		78,304	113,595	122,783	251,170	271,496	226,835	1,352,575
Williams (N. Cin'ti)	426,040	457,732	325,020	208,284	275,168	175,114	70,713	205,002	146,503	102,977	8,281,852
Wills		79,323	60,089	60,082	167,205	161,091	86,557	109,818	181,580	235,751	1,602,672
Winnifred (Day)											
Yates	1,265,142	1,771,502	1,655,820	1,786,063	2,084,263	1,676,699	1,282,513	1,677,186	1,792,355	1,685,267	29,125,385
Yawkey											
Total	14,042,824	18,271,535	19,080,379	20,615,907	27,585,904	24,308,510	21,349,401	34,384,116	38,565,762	42,266 668	449,647,043

Gogebic Range.

Anvil											
Ashland											
Atlantic											
Brotherton											
Cary (and Superior)											
Castile											
Chicago											
Colby											
Davis (Wisconsin)											
Eureka											
Geneva											
Harm'y (Germania)											
Hennepin											
Iron Belt											
Ironton											
Jack Pot											
Meteor (Comet)											
Mikado											
Montreal											
Newport											
Norrie Group											
Ottawa (Odanah)											
Palms											
Pike											
Puritan (Ruby)											
Shores											
Sunday Lake											
Tilden											
Upson											
Yale (West Colby)											
Miscellaneous											
Total											
Miscellaneous — (In Wisconsin)											
Illinois											
Iron Ridge											
Mayville											
Total											

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0,362	
5,432	
6,043	
0,216	
2,708	
289	
7,587	
1,687	
3,395	
5,753	
986	
9,806	
5,993	
9,114	
5,409	
3,844	
5,040	
491	
7,174	
3,261	
5,160	
1,424	
7,805	
1,261	

Section 12	21,887
Spurr	164,244
Taylor	32,970
Titan	90,371
West Republic	133,077
Wetmore	50,870
Wheeling	10,552
Total	5,537,143

MENOMINEE RANGE.

Beta	4,211
Brier Hill	14,981
Cornell	49,302
Delphic	33,770
Emmett	66,585
Half and Half	7,524
Hamilton (Ore Co.)	96,072
Hersel	955
Indiana	17,871
Lee Peck (Cherry Valley Ore)	2,844
Manganate	6,844
Mastodon	425,708
Metropolitan	107,027

Perry	3,138
Selden	2,092
South Mastodon	8,203
Stephenson	39,350
Sturgeon River	19,404
Youngstown	151,425
Total	1,057,306

GOGEBIC RANGE.

Bessemer	20,889
Blue Jacket	1,799
Federal	36,443
First National	1,997
Iron Chief	12,199
Iron Chief No. 2	551
Pence	40,566
Sparta	4,862
Trimble	25,931
Tyler's Forks	10,683
Valley	1,878
Total	157,798

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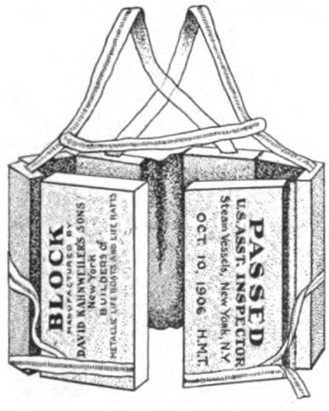

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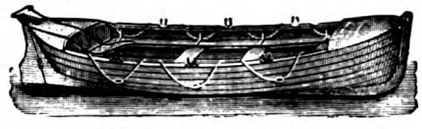

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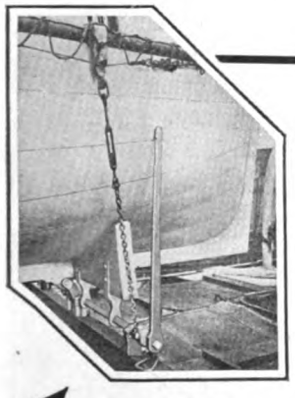

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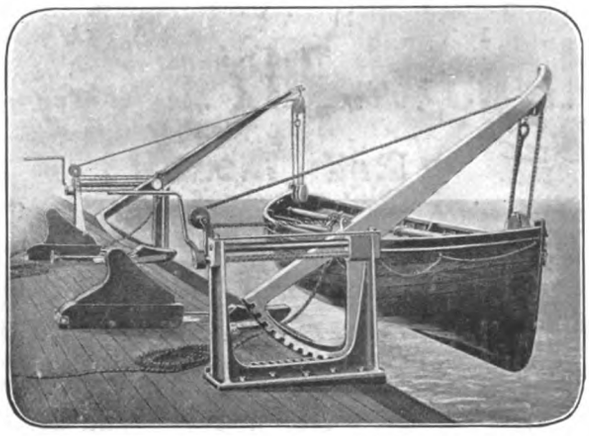

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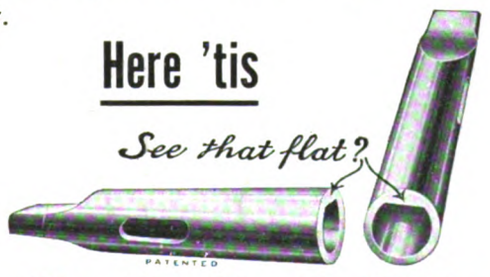

Standard Except the Flat

The "USE-EM-UP" Drill Socket

Just grind a flat on the drill shank (time 2 minutes) and they are better than ever.

American Specialty Company

Chicago

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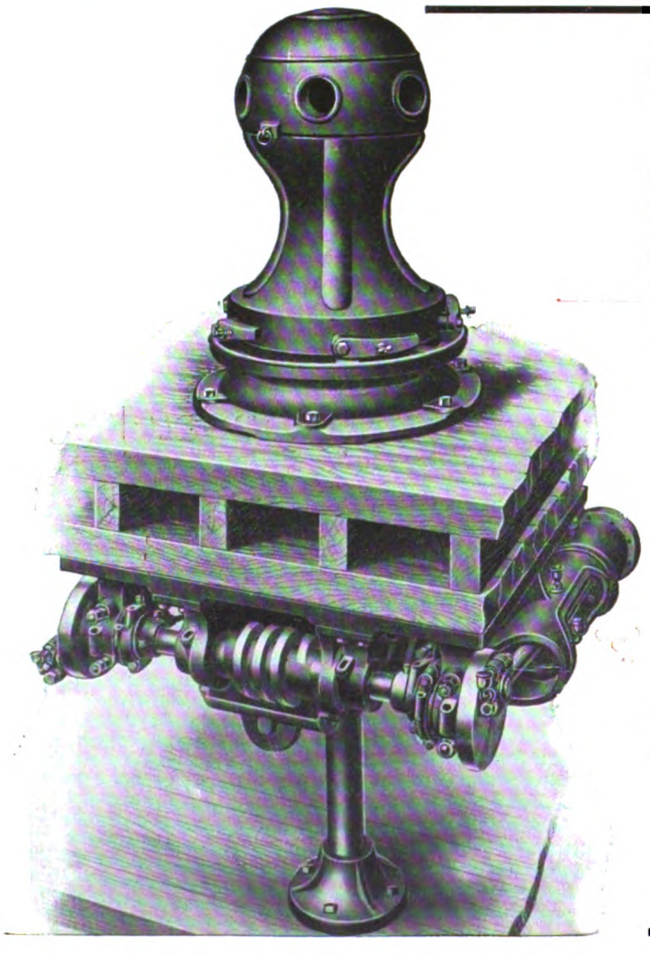

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Near 10th and 23rd St. Ferries
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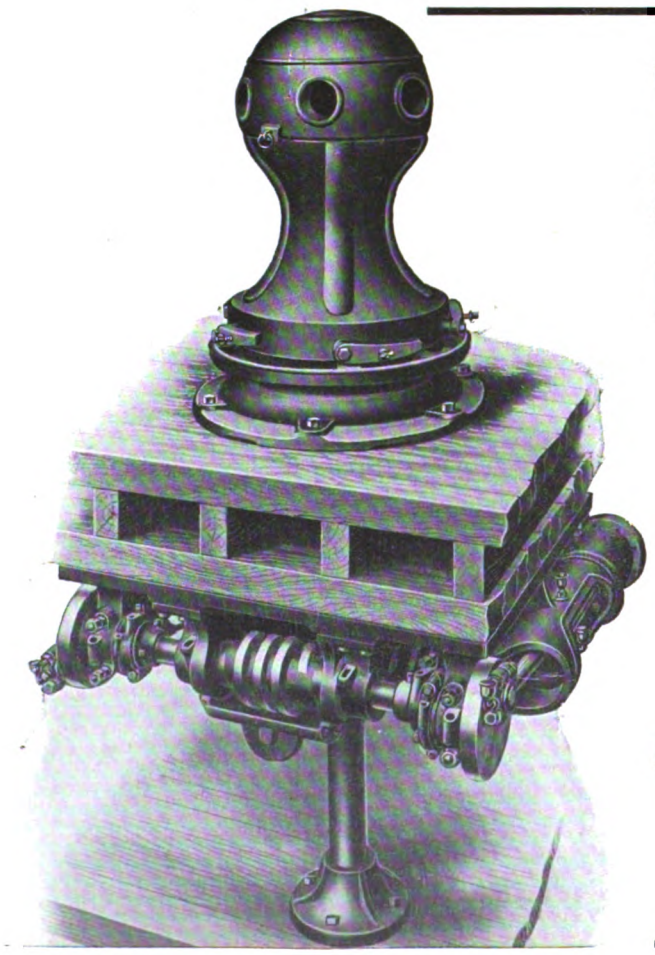
West and Calyer Sts., NEW YORK



We have made Steam Capstans For 30 Years

Built to suit the most exacting requirements for either Government or commercial work. All machines tested under steam before being shipped.

Send for our new catalog which illustrates machines of all kinds.

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PROVIDENCE, R. I.
AND
Williamson Bros. Co.
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THE MARINE REVIEW

VOL. 40 CLEVELAND APRIL, 1910. NEW YORK No. 4

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ASTOR, LENOX AND TILDEN FOUNDATIONS

THE DETROIT RIVER TUNNEL

is nearly completed

The Dredge Handy Andy

has finished her part and is ready for

YOUR JOB.

She does tricks that no other Dredge on the Great Lakes can do.

1—**THROUGH CUTTING.** No other dredge can do this economically. This includes digging channel to stranded boat thro shallow water without bother of scows.

2—**SHE CAN DIG YOUR SLIP** and deposit the material 40 Ft. BEHIND the DOCK LINE.

3—SHE CAN DIG 40 Ft. BEHIND the DOCK LINE and put the material in scows.

4—SHE CAN DIG and drop the material behind her.

5—SHE can dig a TRENCH or TEST PIT 300 Ft. or more or less in DEPTH.

6—She can make a channel 6 Ft. ONLY in DEPTH.

7—WHEREVER she can FLOAT (6 Ft. of water) she can pick up material and deposit it 150 Ft. away.

8—SHE CAN PILE material 25 Ft. high or clear a structure that height.

9—She can dig material out of a Crib WITHOUT DESTROYING the CRIB.

Dunbar & Sullivan Dredging Co.

BUFFALO, N. Y.

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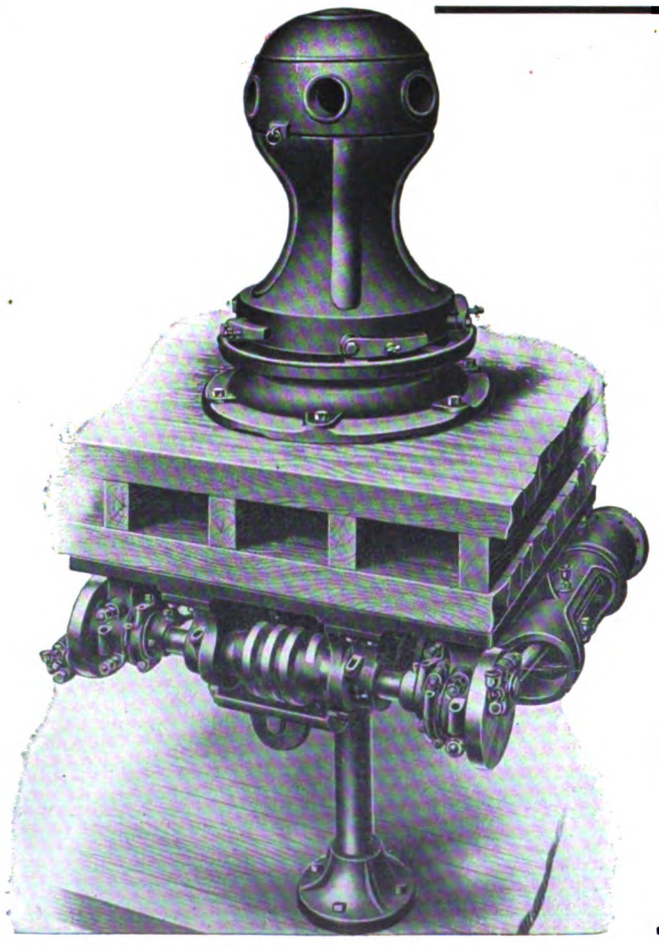

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THE MARINE REVIEW

VOL. 40 CLEVELAND MAY, 1910. NEW YORK No. 5

Vessel Owners---Attention

Nov. 25/09.

THE DETROIT FREE PRESS:

MARINE NEWS

SISTER SHIPS COME TOGETHER

Ball and Hoover and Mason, of Tomlinson Fleet, Damaged in Lake St. Clair.

The big steamers Frank C. Ball and Hoover and Mason, of the Tomlinson fleet, were in head-on collision in Lake St. Clair, near the Grosse Pointe lightship, at midnight Tuesday. Both vessels are considerably damaged and both are leaking.

The collision is ascribed to the steering gear of the Ball going wrong. The Ball is bound down with a cargo of ore, while the Hoover is on her way up the lakes with coal.

The Hoover and Mason returned to the Ecorse plant of the Great Lakes Engineering Works, with her stem broken and pushed about four feet toward the port side, and her starboard anchor gone. The damage extends below the water line and some water is coming in. Joseph King examined the Hoover for the underwriters, and she will be permitted to continue her trip to the head of the lakes, after temporary repairs are made. These are under way, and it is hoped to have them completed late today. Late last night the Ball was lying on the bank near the place of the collision, with some water in her cargo hold. The water is said to have come in through a break in the trim tank. Wrecker H. W. Baker will place a steam pump on the Ball, and the captain believes that after he has pumped the water out of the hold, his boat will come off the bank. The ship's own pumps can keep her free of water without trouble.

HARBOR GETS ONLY

Engineer is Not Im

White Lake's

RATE 2 CENTS

How long do you propose standing for avoidable accidents of this kind?

They may be prevented by using the AKERS EMERGENCY STEERING GEAR.

Best and cheapest insurance.

One premium only.

No annual renewals.

Wake up and protect your business interests.

AKERS STEERING GEAR CO.
1510 McCORMICK BUILDING
CHICAGO

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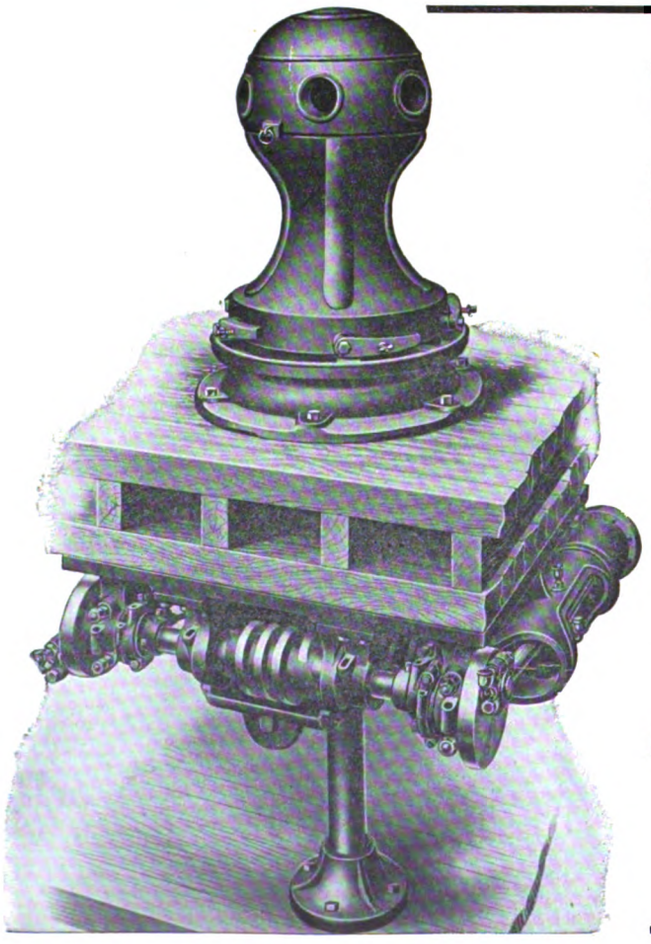

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VOL. 40 CLEVELAND JUNE, 1910. NEW YORK No. 6

"Cyclone" High-Speed Chain Hoist

2 Tons to 12 Tons made as above. Half ton to 1½ Tons are made with Single Load Chain.

WITH SELF-LUBRICATING BEARINGS
ALL CUT GEARS

Patent Gyrating drive through Roller Bearing Eccentrics gives Maximum Efficiency and Durability. Design entirely different from all others. Few wearing parts. Does not get out of order.

The Bearings of the Hoist have Graphite Bronze Bushings. They are self-lubricating, they require no oil, and will run indefinitely without cutting.

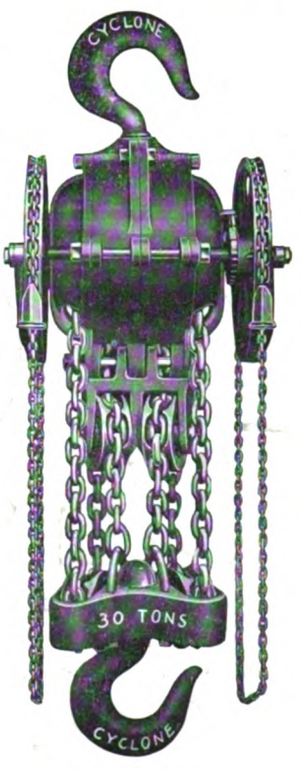
There is the least possible friction loss, the efficiency averaging nearly 80 per cent. It can therefore be geared to a higher speed than any other hoist with no greater hand wheel pull.

When there is no load the hand wheel may be spun in either direction.

When the hand chain is released the **Automatic Brake** immediately locks the block so that the load is safely held at any point. It may be readily lowered, however, by a reverse pull on the hand chain.

WE WILL ACCEPT FIRST ORDERS
SUBJECT TO APPROVAL
AFTER TEN DAYS TRIAL

Send for Catalog Illustrating
Full Line of Hoists and Trolleys



30 Tons

Sectional View

THE CHISHOLM & MOORE MFG. CO.

CLEVELAND, O., U. S. A.

Sectional View

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29000

Machines In Use Today

BUILT BY

Williamson Brothers Co. Philadelphia, Pa.

American Ship Windlass Co.,

PROVIDENCE, R. I.

Windlasses, Steering Engines, Winches, Capstans, Towing Machines.

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WITH SELF-LUBRICATING BEARINGS
ALL CUT GEARS

Patent Gyrating drive through Roller Bearing Eccentrics gives Maximum Efficiency and Durability. Design entirely different from all others. Few wearing parts. Does not get out of order.

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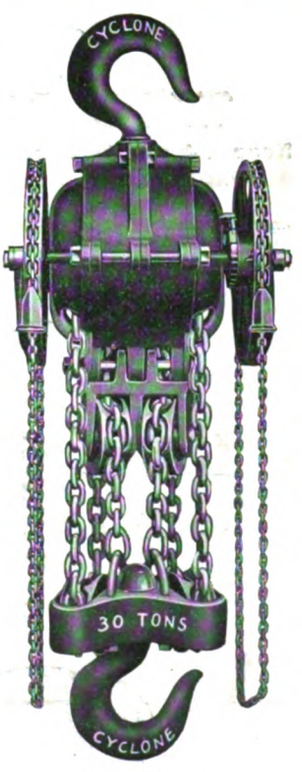

30 Tons

Sectional View

THE CHISHOLM & MOORE MFG. CO.

CLEVELAND, O., U. S. A.

Sectional View

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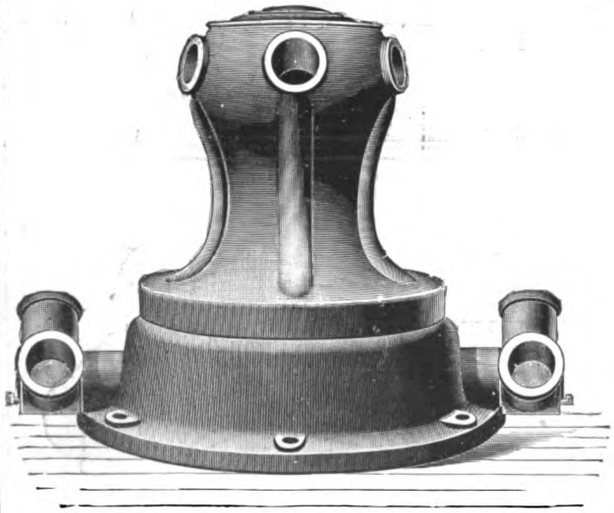

THE USES TO WHICH A

"Providence" Cavel Capstan

CAN BE PUT ARE TOO NUMEROUS TO MENTION HERE

The cut will doubtless suggest some use to which you can put it to advantage.

NEAT, COMPACT AND RELIABLE

Used on Barges, Tugs, Steamers and Yachts.

THE TWO SPEED "PROVIDENCE" RATCHET CAPSTAN

HAS NO EQUAL

FOR CLOSE QUARTERS

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PROVIDENCE, R. I.

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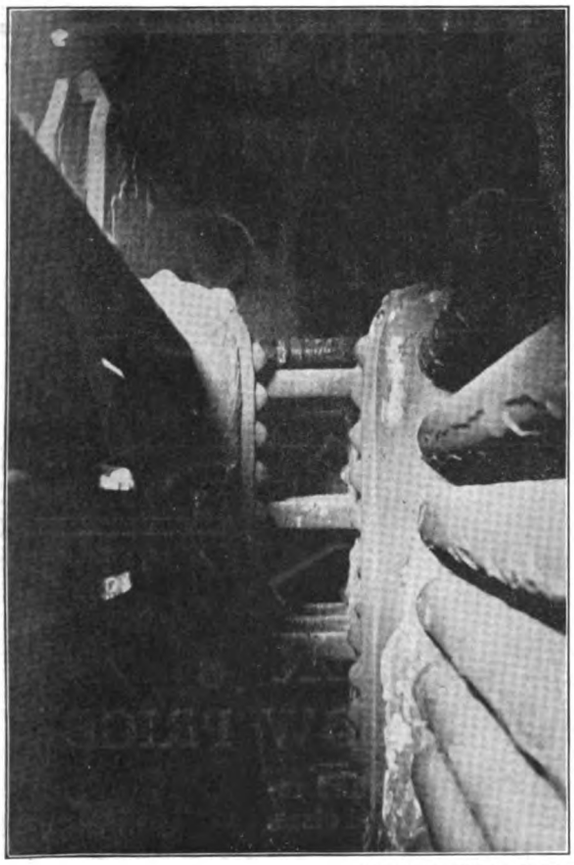
Minimize Cost of Boiler Operation

WITH THE

Rogers Steam Boiler Heater, Purifier, Oil Separator and Circulator

The safest and surest warrant of true economy in boiler effort. This effective device is used and commended by the leading engineers and owners for its efficiency, economy and simplicity.

Note particularly here the tubes with scale removed. This effect produced on a marine boiler after three months service of the Rogers' Purifier.



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Great Lakes Engineering Works.	Toledo Ship Building Co.	Newport News Ship Bldg.Co.
Hull No. 31	Hull No. 111	New York Ship Bldg. Co.
Hull No. 32	Hull No. 115	Ecorse Stationary Plant.
Hull No. 33		
Hull No. 37	**Mutual Transit Co.**	Fremont Yaryan Co.
Hull No. 39		
Hull No. 40	Steamer Northern Star	Zehner Bros. Packing Co.
Hull No. 41	Steamer Northern King	
Hull No. 42	Steamer Northern Light	Blue Isl'd Brick Yard No. 22
Hull No. 43	Steamer North Wind	
Hull No. 53	Steamer North Wave	Shipowners' Dry Dock Co., Chicago, Ill.
Hull No. 56	Steamer Minneapolis	
Hull No. 57	Steamer St. Paul	
Hull No. 62	Steamer Huron	Page Boiler Co., Chicago, Ill.
Hull No. 64	Steamer Wm. Castle Rhodes	
Hull No. 66	Steamer North Lake	Buffalo Dry Dock Co., Buffalo, N. Y.
Hull No. 70	Steamer North Sea	
Hull No. 71		
Hull No. 72	**Union Steam Boat Line.**	
Hull No. 73	Steamer Binghamton	
Hull No. 77	Steamer Tioga	
Hull No. 78	Steamer Owego	**Steamers.**
	Steamer Chemung	
American Ship Bldg. Co.	Steamer Starucca	
	Steamer Ramapo	Thomas J. Barlum
Hull No. 112	**W. A. & H. A. Hawgood.**	Yale
Hull No. 176		F. C. Ball
Hull No. 178	Steamer Abraham Stearns	Wm. B. Davock
Hull No. 182	Steamer Henry B. Smith	L. C. Hanna
Hull No. 183	Steamer J. Q. Riddle	Capt. Thomas Wilson
Hull No. 184	Steamer Sheldon Parks	Yuma
Hull No. 216	Steamer Salt Lake City	Oliver
Hull No. 351	Steamer Wm. A. Hawgood	Matthew Andrews
Hull No. 357	Hull No. 626	Stafford
Hull No. 359		Castalia
Hull No. 368	**L. V. Trans. Co.**	Hugh Kennedy
Hull No. 377		Myron
Hull No. 379	Steamer Tuscarora	Bradley
Hull No. 441	Steamer Saranac	Zillah
Hull No. 444	Steamer Seneca	P. P. Miller
Hull No. 520	Steamer Bethlehem	W. H. Gratwick
Hull No. 521	Steamer Wilkesbarre	Clyde
Hull No. 626	Steamer Mauch Chunk	Corsica
	Ltr. Batavia	North West
		North Land

Positively no failures to date.

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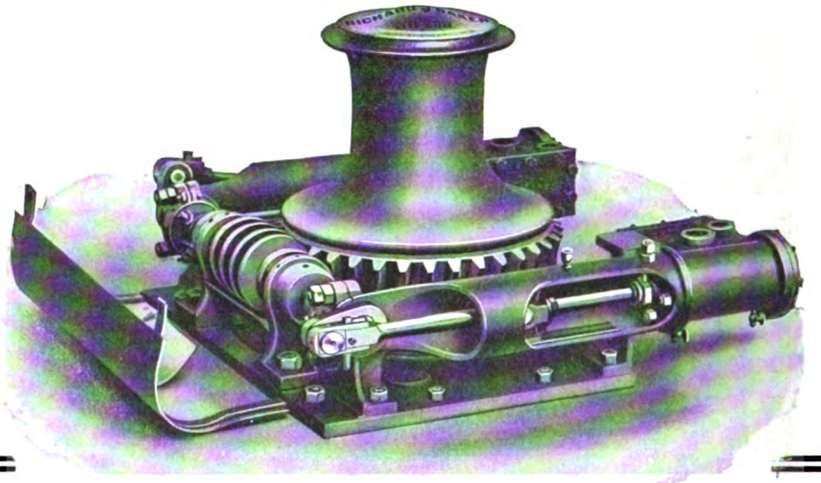

A HAWSER PULLER

FOR LIMITED SPACE AT A LOW PRICE

It is compact, takes up very little deck space and requires no room under the deck. Made in several sizes.

AMERICAN SHIP WINDLASS CO. Providence, R. I.

WILLIAMSON BROS. CO., Philadelphia, Pa.

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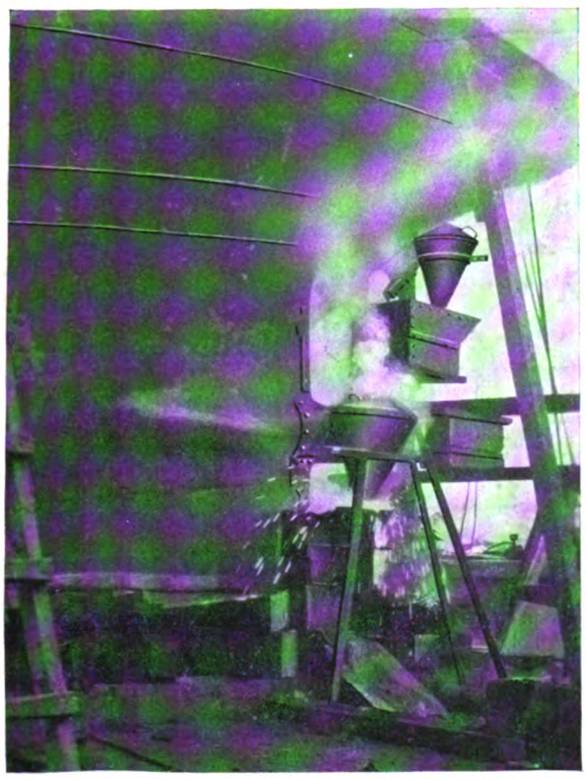
Welds Sternposts, Rudder Frames and Rudder Posts without removing them from the vessel.



Vessel in Dry Dock only Two or Three Days.

Why spend thousands of dollars and waste weeks of valuable time on these repairs when we can weld with THERMIT and return your vessel to service in a few days? The Thermit Process has received the sanction of the British Corporation for the Survey and Registry of Shipping, Glasgow, and we have executed a large number of successful repairs for the leading steamship owners of the Atlantic and Pacific Coasts and the Great Lakes.

All work is executed by us under guarantee, and we will submit estimates promptly on receipt of dimensioned sketch, showing what will have to be done.

Write for Pamphlet No. 20-E

Goldschmidt Thermit Company

90 WEST STREET, NEW YORK

432-436 Folsom St., San Francisco

103 Richmond St. W., Toronto, Can.

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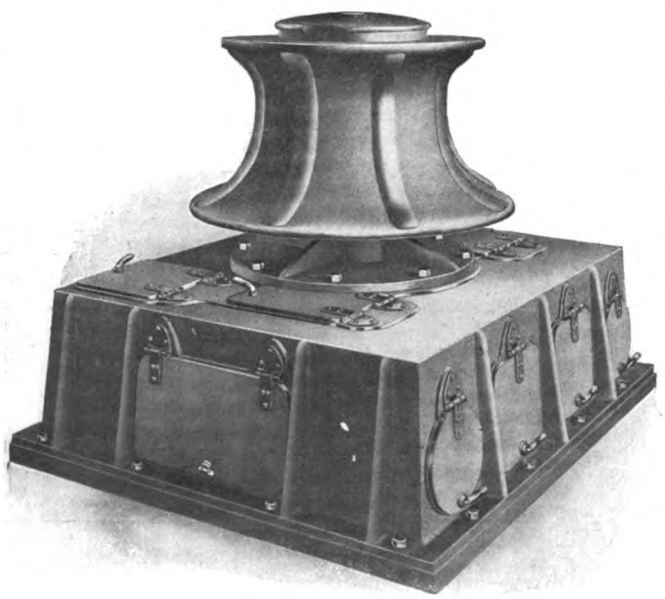

A STEAM GYPSEY WITH ENCLOSED ENGINES

NOTE.—Whenever it is impossible to place the engine below deck, this type of Steam Gypsey or Hawser Puller will be found most convenient. It is especially adapted for use on tugs. Made in all sizes.

AUXILIARY MARINE MACHINERY

WILLIAMSON BROS. CO.
PHILADELPHIA, PA.

and

AMERICAN SHIP WINDLASS CO.
PROVIDENCE, R. I.

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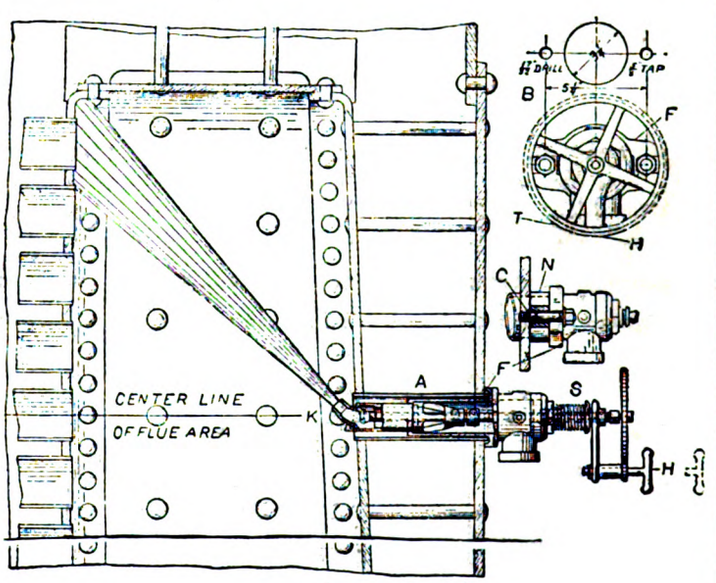
SOOT -:- SOOT -:- SOOT -:- SOOT

Diamond Blowers

Standard Type

Universally known for installation on rear end

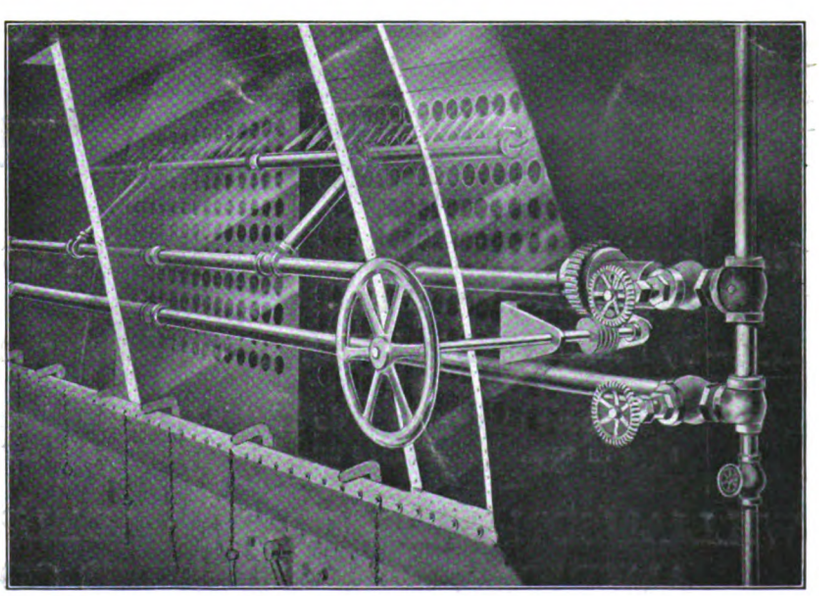
20,000 in use



Have Your Choice

Special Type

For double ended boilers and for installation on front of single end boilers



"DIAMOND"
Power Specialty Co.
76-78 First St.
DETROIT, MICH.

Classified Directory for Buyers---Page 84.

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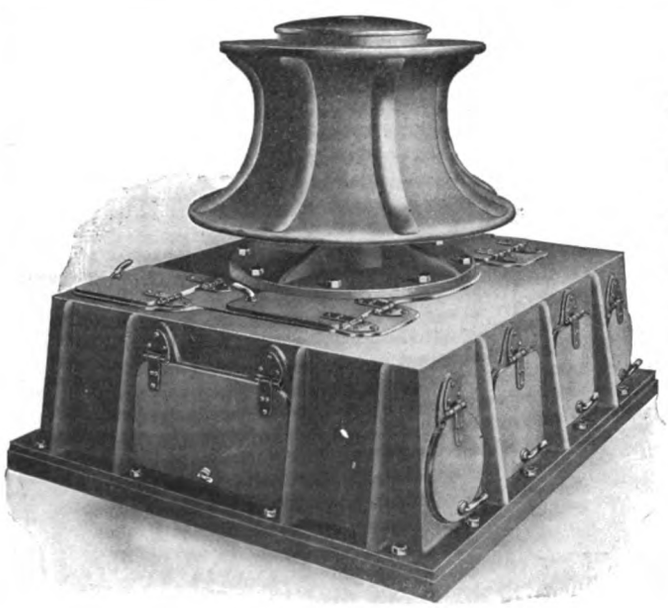

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VOL. 40 CLEVELAND NOVEMBER, 1910. NEW YORK No. 11

Improved Boat Detaching Device

Showing boat lashed on deck. This "holding down" attachment is made in several sizes and can be applied to any size life boat

New detachable shackle for lashing a life boat in the chocks as well as for releasing the falls.

Both hooks must cut at the same instant, thus launching on an even keel.

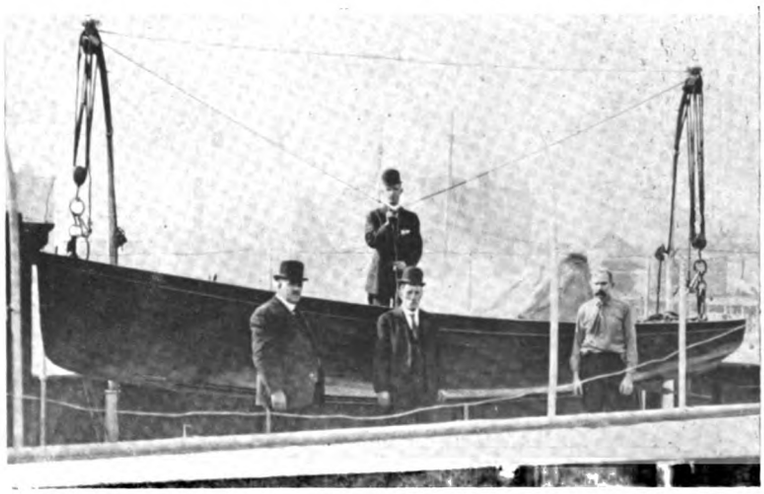
Being of wire construction it can never freeze.

It can be attached to any style of davits.

Ready for instant use in all weather

Sailors declare the device to be the finest ever invented for the purpose.

It instantly releases a boat from its cradle and guarantees an even drop into the water.



Approved by the Steamboat Inspection Service.

Showing boat ready to cut into the water.

We will make special prices for a limited time. For terms apply

Kinney Bros., 150 O'Connell Ave., Buffalo, N. Y.

Classified Directory for Buyers---Page 84.

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Morison Suspension Boiler Furnaces

FOR LAND AND MARINE BOILERS

Uniform Thickness **Easily Cleaned** **Unexcelled for Strength**

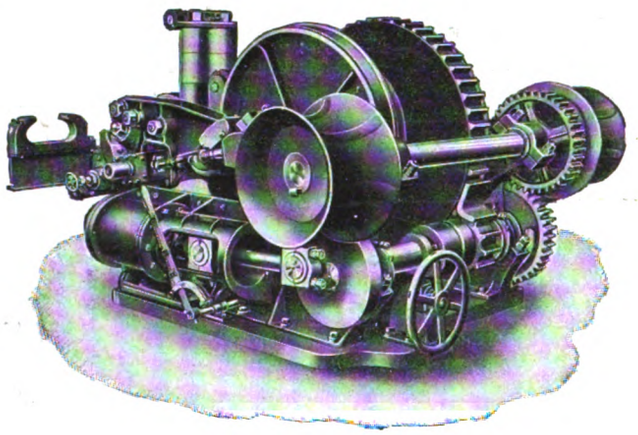
Also FOX CORRUGATED FURNACES

Manufactured by

THE CONTINENTAL IRON WORKS

Near 10th and 23rd St. Ferries
BOROUGH OF BROOKLYN

West and Calyer Sts., NEW YORK



GRASP THE OPPORTUNITY TO SAVE MONEY IN TWO WAYS

1st---By using steel in place of manila towing hawsers, thus ***saving 85 per cent*** of your hawser bill.

2nd---By saving time in handling your hawsers and making up your tows.

The above machine will do all this for you and more. It is the latest design in towing machines and has gypsey heads for handling manila lines

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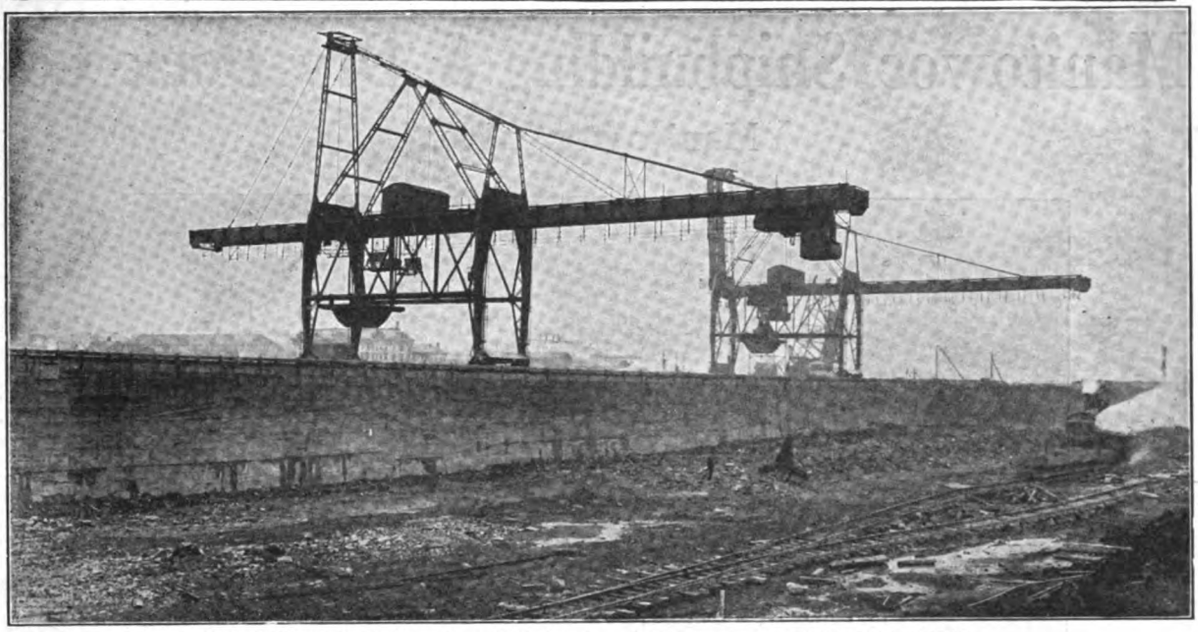

"Fast Plants" Designed and Built for the Penna. Co. at Buffalo, N. Y.

THE BROWN HOISTING MACHINERY CO.

Engineers, Designers and Manufacturers of all kinds of Hoisting Machinery.

CLEVELAND, OHIO

Branch Offices: NEW YORK and PITTSBURG

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SHIP-LOGS

CAUTION

All Rotators for Walker's Ship-Logs have the following Trade-Mark stamped on every Vane:

T.W

Rotators without this Trade-Mark should not be used.

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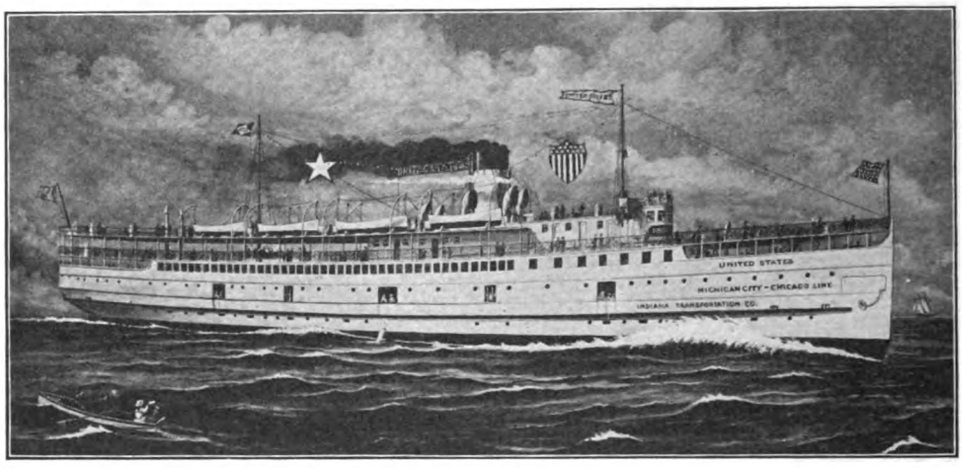
Manitowoc Shipbuilding & Dry Dock Co.

Manitowoc, Wis.



Specializing in the Design and Construction of Passenger Boats, Fire Boats, Lighters, Tugs, Yachts, Dipper and Suction Dredges, etc. Engines of any size or type.

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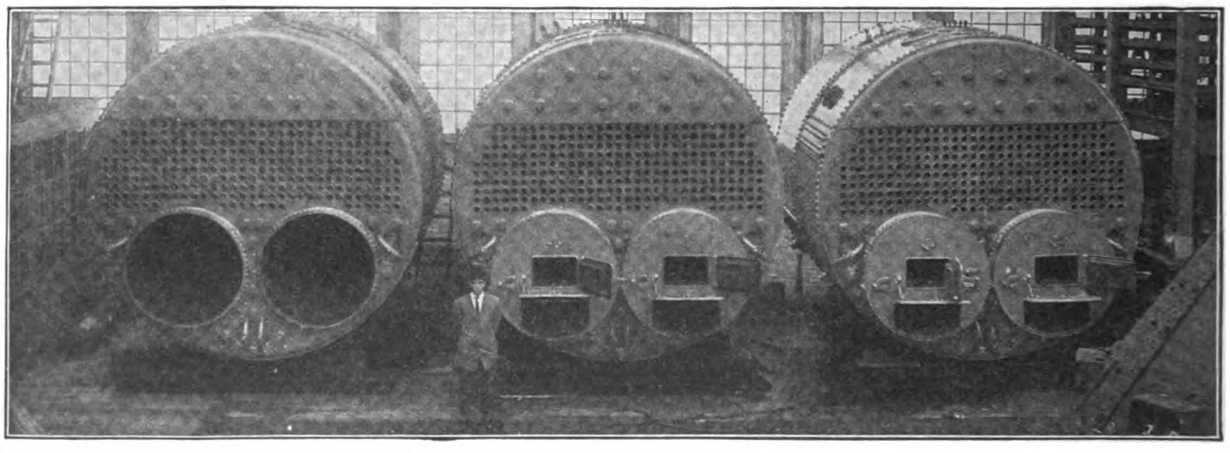
MARINE BOILERS

Best arrangement on Great Lakes for Economical Boiler Repairs



Manitowoc Boiler Works Company

Manitowoc, Wis.

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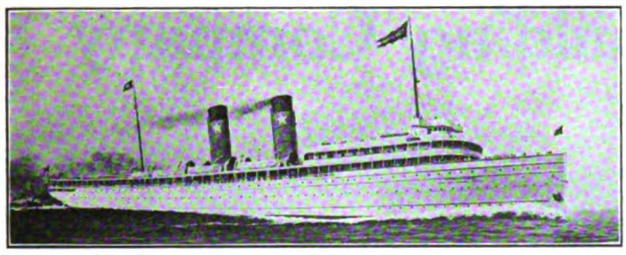
The American Ship Building Company



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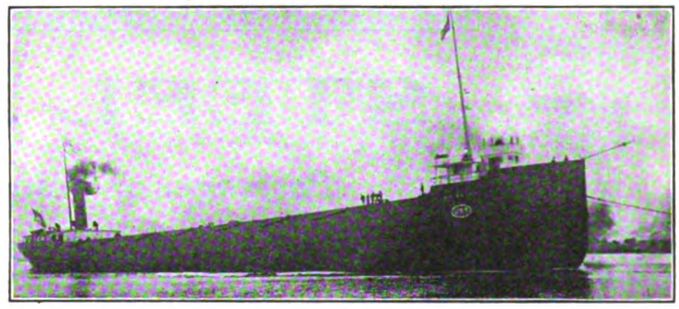
Marine and Stationary Engines **STEEL SHIPS** Boilers and Auxiliary Machinery

Sole Agents for the Lakes for the Ellis & Eaves Induced Draft System, and "Brew's" patent flue blower, as applied to boilers.

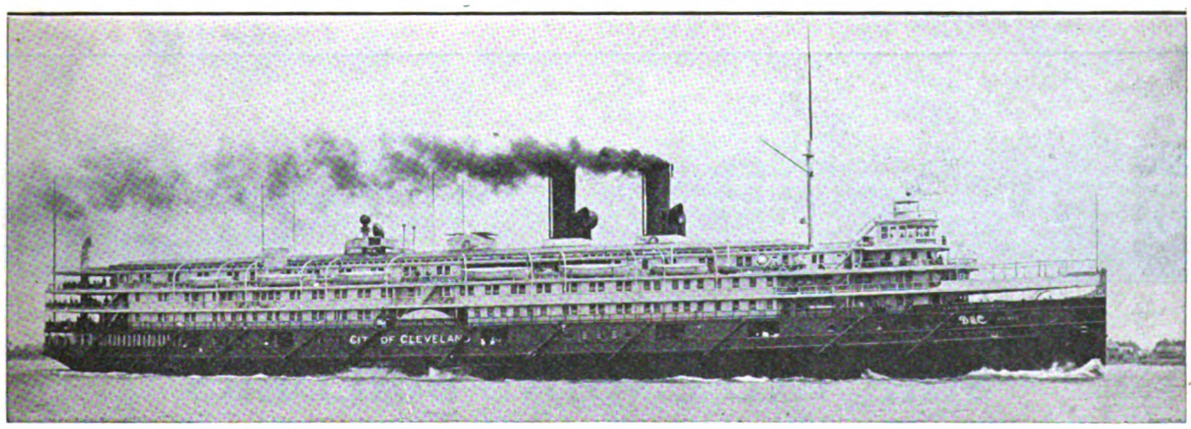
Works at CLEVELAND and LORAIN



M. E. Farr, Pres. and Treas. P. H. McMillan, Vice Pres. E. Ketcham, Secretary Frank Jeffrey, Gen. Supt. John D. Langell, Supt. of Dry Docks and Repairs

Detroit Shipbuilding Company

Established 1852



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Designers and builders of all types of

Freight and Passenger Steamers, Engines, Boilers and Auxiliary Machinery

Manufacturers of BRASS MARINE HARDWARE and BRASS SPECIALTIES.
Builders of Metallic Life Boats and Clark Patent Metallic Life Rafts.

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First-class equipment for making hull and machinery repairs

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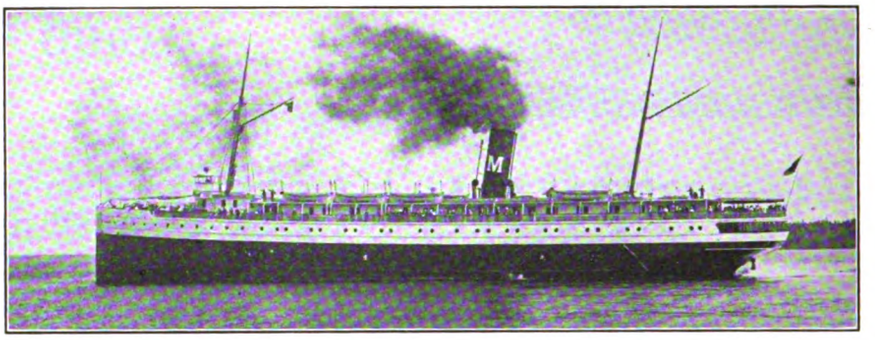
Chicago Ship Building Company



STEEL SHIPS

Passenger or Freight—Any Size

Yards, Dry Docks and Repair Shops at South Chicago, Ill.

The Superior Ship Building Company

SUPERIOR, WISCONSIN

SHIP AND ENGINE BUILDERS

Dry Docks and Repairs of all kinds

Large stock of material always on hand for Repairing Wooden and Metal Ships

REPAIRING promptly attended to Night or Day

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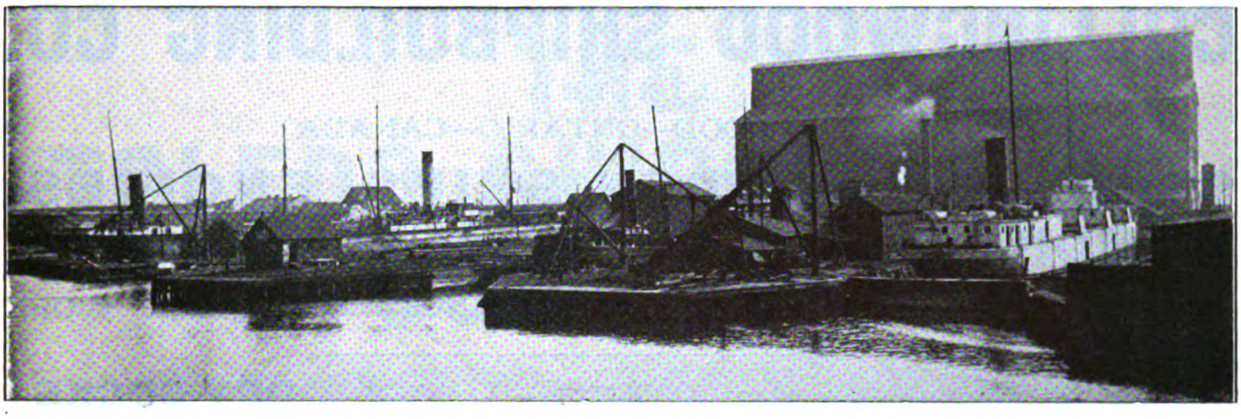

The Buffalo Dry Dock Company

BUFFALO, N. Y.

With our excellent equipment we are enabled to do all kinds of ship repairs at reasonable cost to the owners, whose patronage is solicited with the guarantee of satisfaction in all particulars.

We call attention to our facilities for the construction of new vessels of all kinds, particularly dredging outfits, tugs, scows, fuel lighters, etc., plans for which we will furnish on application together with specifications and estimates of cost.

EDWARD SMITH, President. EDWARD N. SMITH, Superintendent. WILLIAM KNIGHT, Ass't Sec'y and Treas.

Office Telephone, Bell, 4055 Seneca; 515 Frontier. President's Office Telephone, 2329 Seneca.
President's Residence Telephone, 209 Bryant. Ass't Sec'y's Telephone, 324 North.
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Milwaukee Dry Dock Company

MILWAUKEE WISCONSIN

SHIP REPAIRS
OF ALL KINDS

We have two ship yards offering every facility for the repair of both steel and wooden vessels. South Yard Dock is 450 ft. long on keel blocks; 460 ft. over all; 60 ft. width of gate and 16 ft. over sill. West Yard Dock is 312 ft. on keel blocks; 45 ft. width of gate and 12 ft. over sill. Rudder pit in each dock. Electric light for night work.

MAIN OFFICE AT SOUTH YARD
Foot of Washington Street
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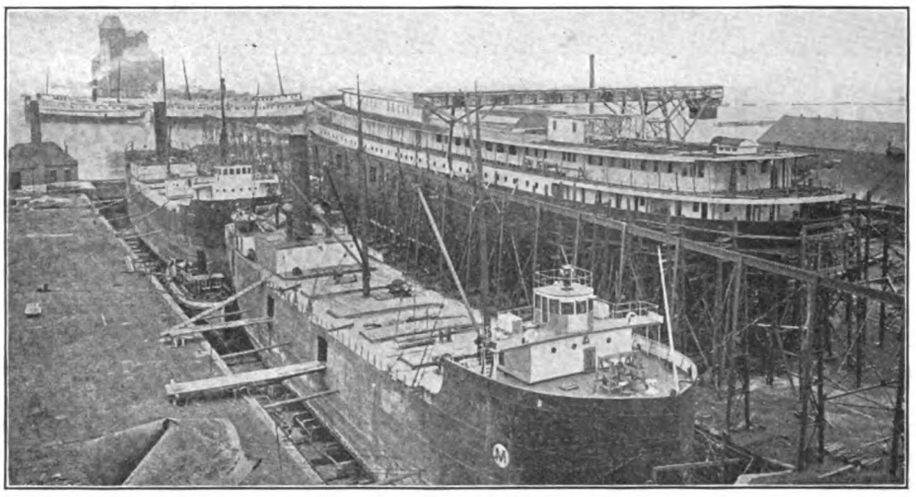
PLANT FITTED WITH MODERN APPLIANCES FOR QUICK WORK



DRY DOCKS

and

SHOPS

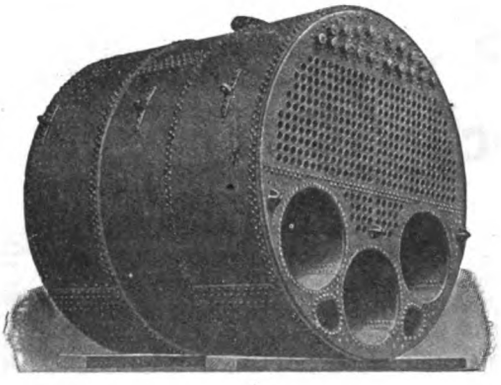
EQUIPPED TO

OPERATE

DAY or NIGHT

on

REPAIRS



MODERN MARINE BOILERS

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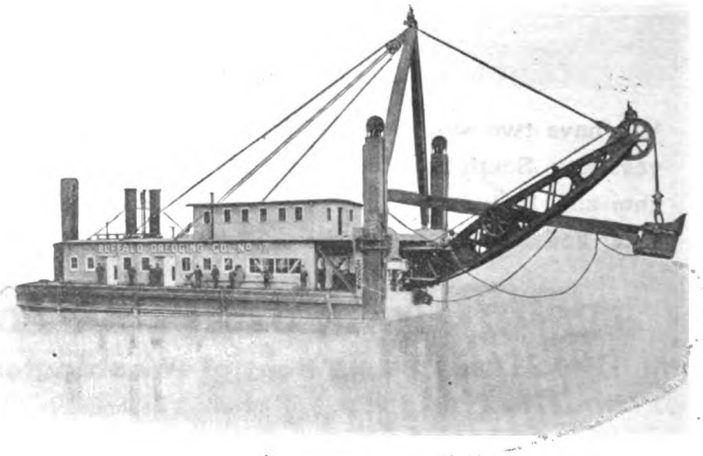
STEEL SHIP BUILDING

Tugs, Passenger Steamers and Special Construction



Write

Johnston Brothers

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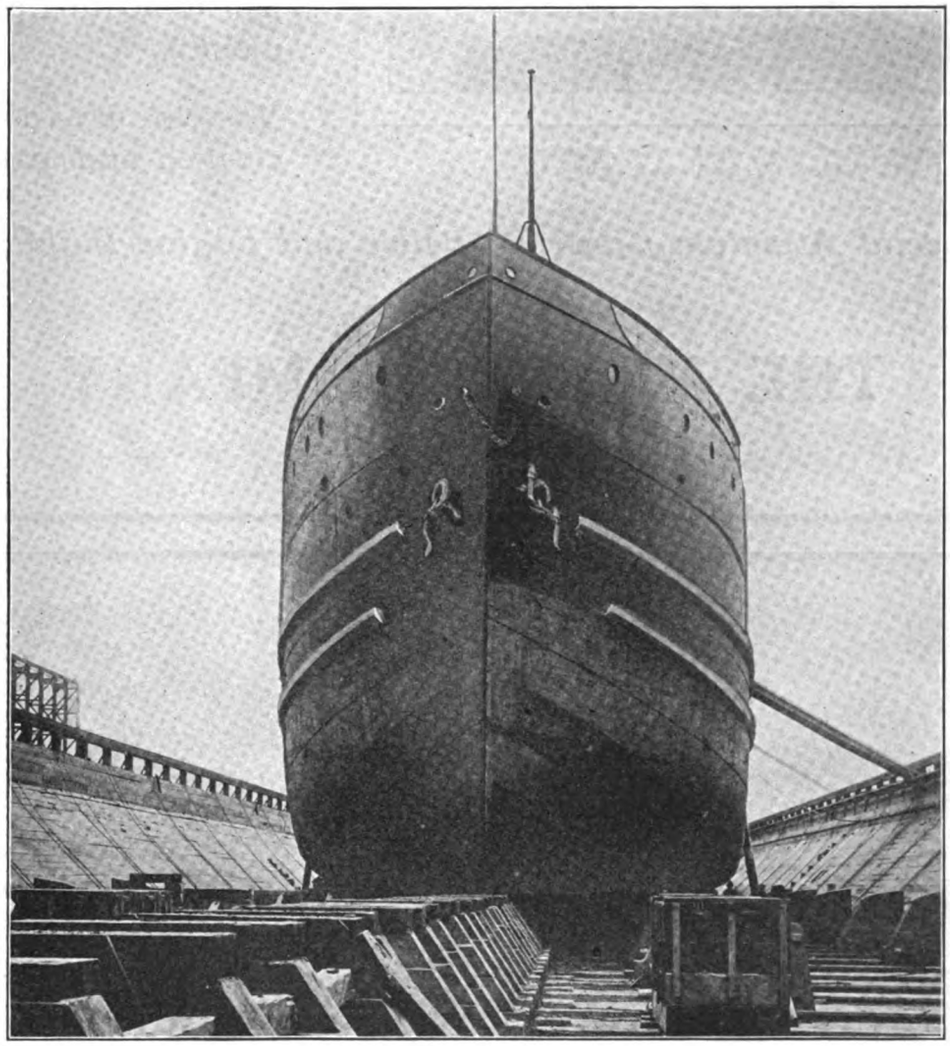
THE TOLEDO SHIPBUILDING COMPANY



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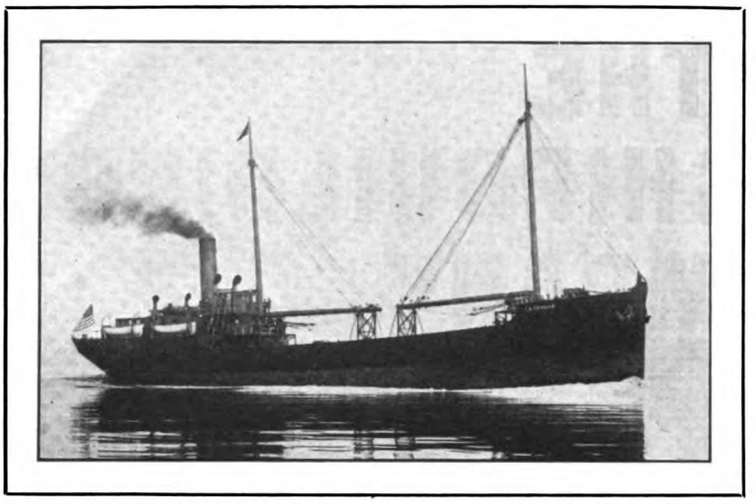


"La Touche," Steel Freight and Passenger Steamer, Built by THE MORAN CO. for Alaska Steamship Co.

Ships Of All Classes Designed, Built and Repaired

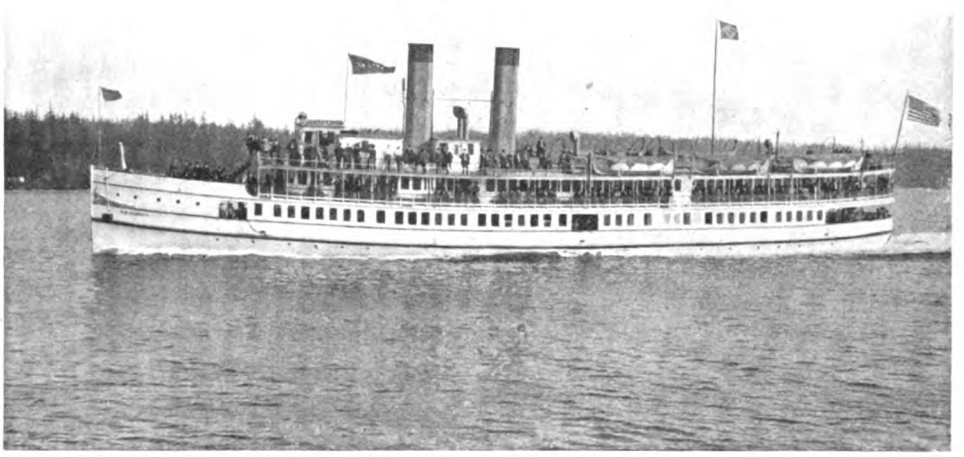
Every facility for the construction and repair of floating equipment.

Vessels dry-docked, cleaned and painted.

Special Attention Given To Boiler and Engine Building

THE MORAN COMPANY

Seattle, U. S. A.



Passenger Str. "H. B. KENNEDY"—Speed 21 Miles Per Hour.

We Design, Build or Repair Steel Vessels of any description—

Fast Passenger Boats, Tug Boats, Fire Boats, Steam Schooners, Stern Wheel Boats, Barges, &c.

Repair work promptly and economically executed.

The following clipping from the "Seattle Post Intelligencer" of September 22, 1910, is worthy of note:—
"With a large party of marine architects and engineers on board, the "Kennedy" was taken over the measured naval course off Three-Tree Point. In spite of the fact that the "Kennedy" has not been cleaned in Dry-Dock for more than three months, she did better than 18 knots an hour. This is almost 21 statute miles per hour. What was even more surprising to the experts was that she made 15.88 knots an hour with only one of her two boilers operating."

WILLAMETTE IRON & STEEL WORKS

ENGINEERS AND SHIPBUILDERS **PORTLAND, ORE.**

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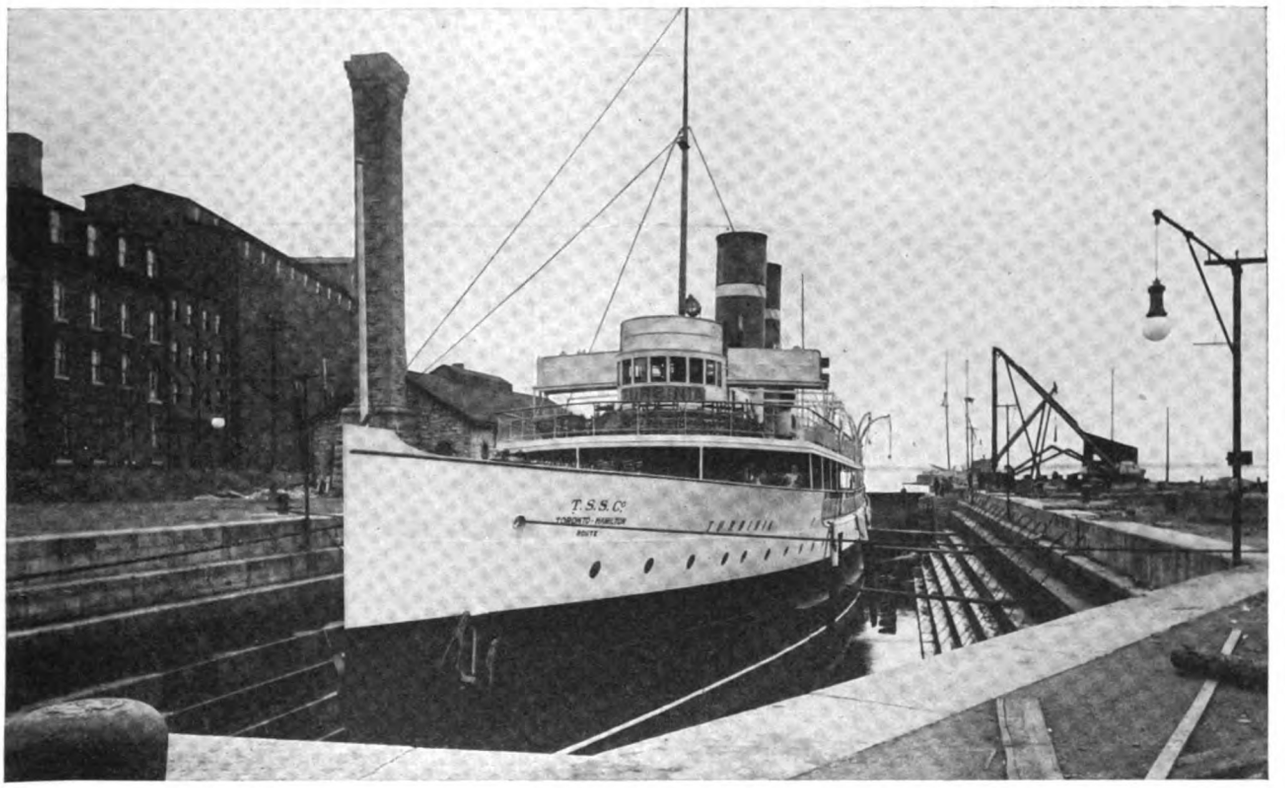
Kingston Shipbuilding Company, Ltd.

KINGSTON, ONT.

CANADA



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BEST FACILITIES FOR

SHIP REPAIRS

Steel Structural Work

Plant fully equipped for work by day or night

Stone Dry Dock
323 feet long
55 feet width at gate.
16 feet water over sill.

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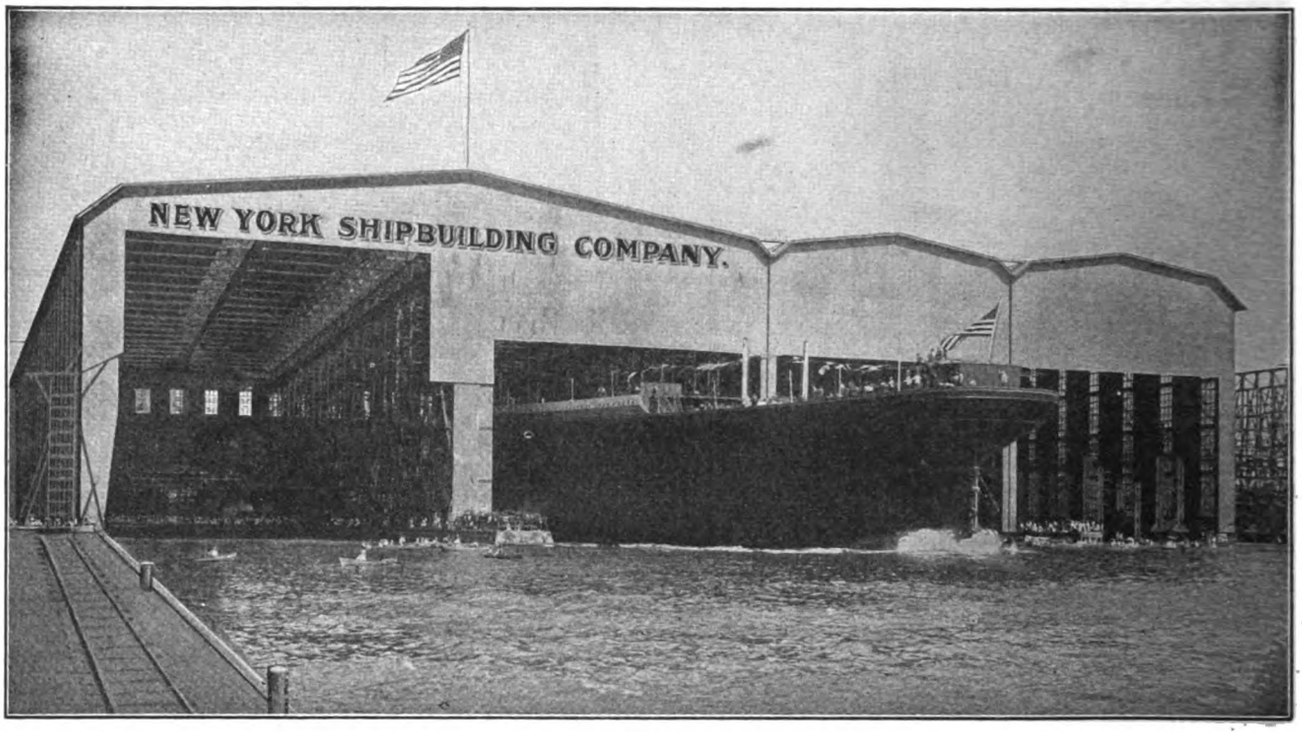
New York Shipbuilding Company

Main Office and Works, Camden, N. J. **New York Office, 12 Broadway**



Launch of "Mongolia," Pacific Mail S. S. Co., 615 feet long, 65 feet beam, 51 feet deep.

BUILDERS OF

SHIPS, ENGINES, BOILERS and HEAVY MACHINERY

BEST FACILITIES FOR REPAIR WORK

Pneumatic and Electric Tools; Ample wharfage accommodation.

One Hundred Ton Crane

Repairs done under Shelter

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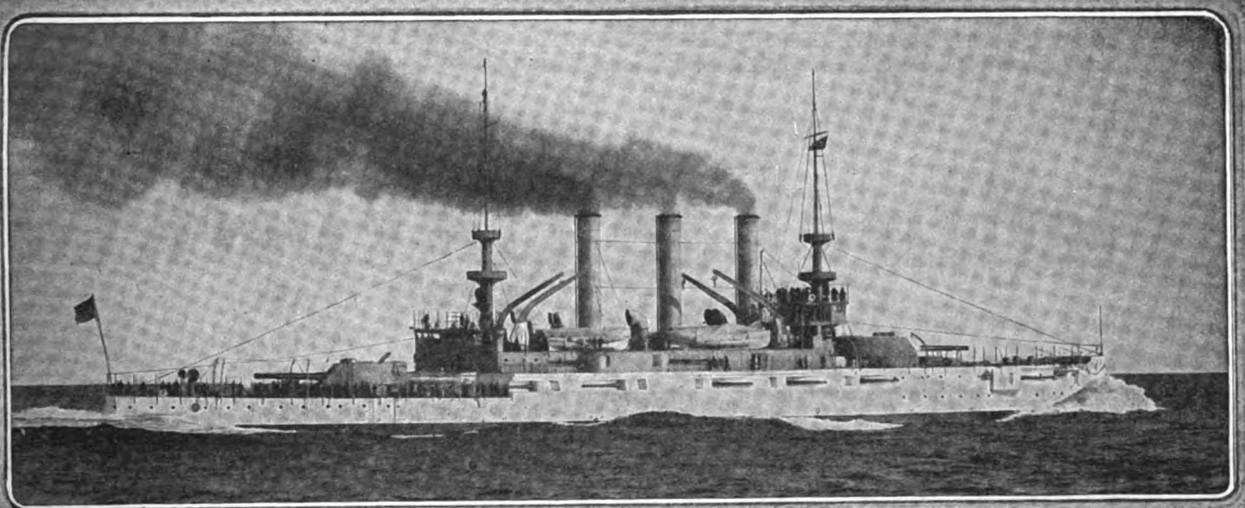
OUR SHIPYARD

WITH ITS ACCOMPANYING DRY DOCKS AND WORKS, WAS CAREFULLY DESIGNED, EQUIPPED AND COMPLETED FOR THE



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NEWPORT NEWS SHIPBUILDING & DRY DOCK CO.

30 CHURCH ST NEW YORK — NEWPORT NEWS, VA.

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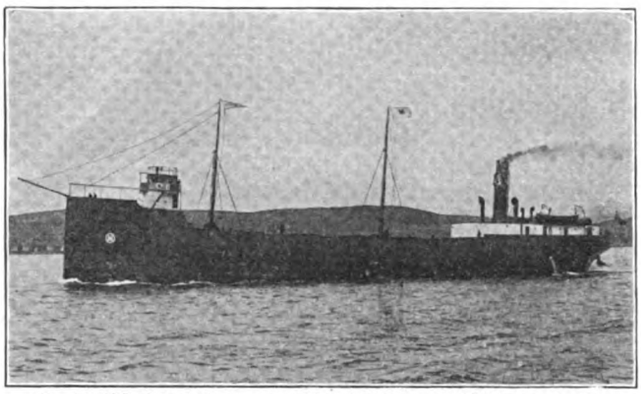

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SHIPBUILDERS, ENGINEERS, and BOILERMAKERS
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We construct up to date Package and Bulk Freight
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Tietjen & Lang Dry Dock Co.
Hoboken, N.J.

EIGHT DRY DOCKS
600, 800, 1,000, 1,200, 1,400, 1,800, 2,000, 10,000 TONS.

General Repairs on Wooden and Iron Vessels.

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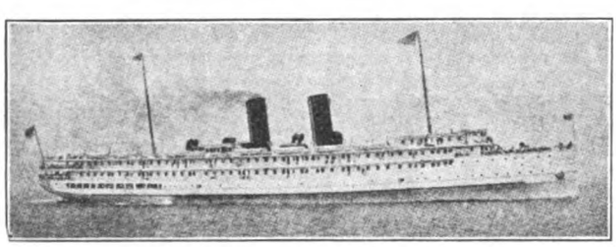

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MARINE TURBINES
Marine Engines, Boilers
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Contractors for
Vessels Complete.
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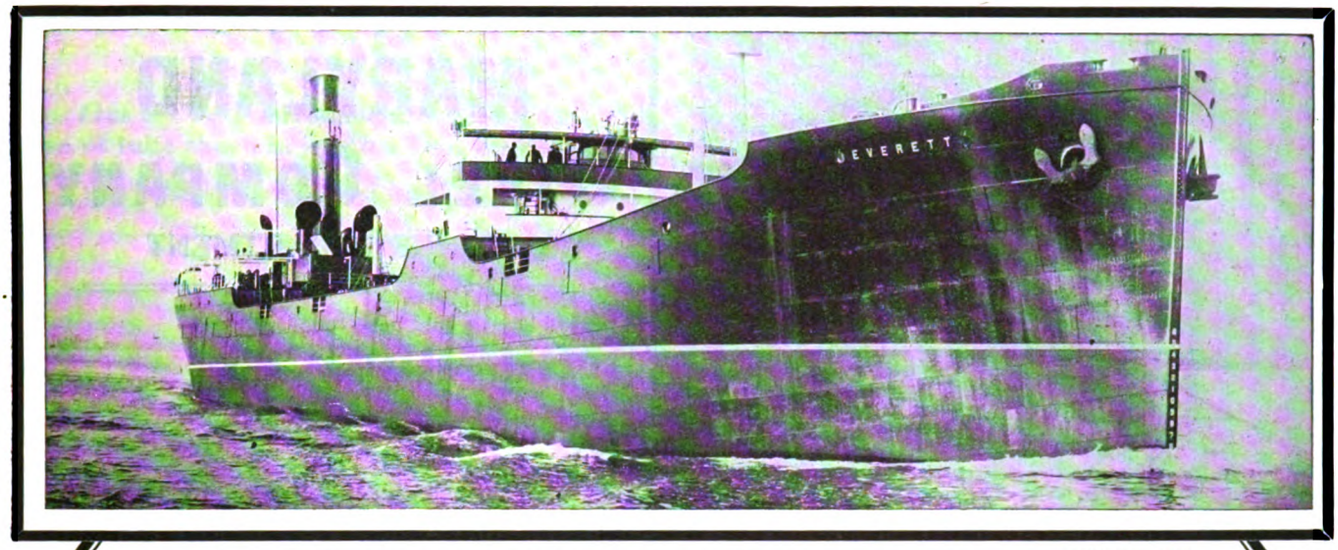

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CURTIS MARINE TURBINES

Holland Submarine Boats
Motor Boats

Excellent Repair Facilities
HIGH GRADE FORGINGS

Yarrow Watertube Boilers
Brass, Bronze and Iron Castings

BATH IRON WORKS
LIMITED
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Shipbuilders and Engineers

Licensee for
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Particular Attention Given to
High Speed Requirements
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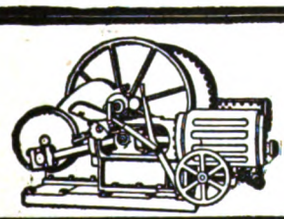
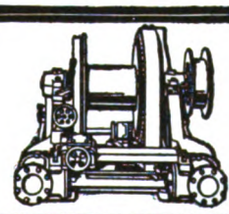
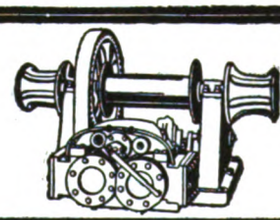

AUTOMATIC TOWING MACHINES
The Latest and the Best
Positively guaranteed

DOCKING ENGINES
Mooring Winches
Latest Improved Types

HOISTING ENGINES
Of all kinds and sizes and for all purposes especially for ship use

FOR THESE AND OTHER WELL KNOWN SPECIALTIES ADDRESS ALL INQUIRIES TO
THE CHASE MACHINE CO. ENGINEERS AND MACHINISTS CLEVELAND, O.

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Searchlight Projector, Illuminating Capitol at Albany, N. Y.

General Electric Searchlight Projectors

Wide Field of Usefulness.

G-E Searchlight Projectors meet the severe requirements of marine service—their widest application. They are extensively used on yachts, passenger steamers, dredges and merchant vessels of all kinds; for picking up buoys in the channel; for illuminating the scene of an accident, the scenery along the route, etc.

The Hundreds in Use Prove Their Absolutely Satisfactory Operation.

The General Electric Company already has supplied hundreds of projectors for vessels of the U. S. Government, including battleships, cruisers, monitors, gunboats, torpedo boats, lighthouse tenders, etc., in addition to those supplied for army fortifications and similar service. Hundreds of smaller projectors are giving entire satisfaction on ferry boats, tugs, freighters, dredges, yachts, passenger steamers, fire boats and the like.

Convenient Sizes.

The standard commercial sizes are 9, 13 and 18 inches in diameter, but larger projectors of 24, 30, 36, 48, 60 and 80 inches can be supplied on special request.

Four Methods of Control.

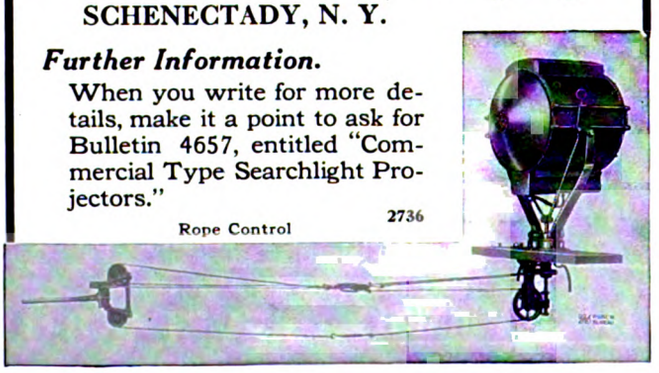
G-E Searchlight Projectors are arranged for hand, pilot-house, rope or electric control.

General Electric Company

SCHENECTADY, N. Y.

Further Information.

When you write for more details, make it a point to ask for Bulletin 4657, entitled "Commercial Type Searchlight Projectors."



Rope Control 2736

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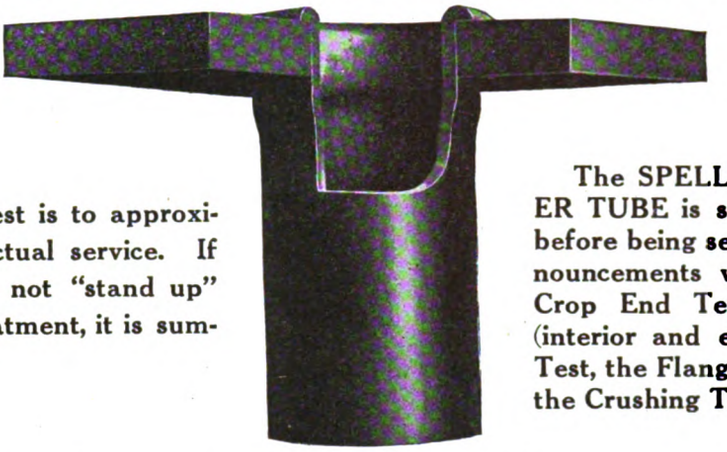
(No. 6)*

TUBE SETTING TEST

This is a severe treatment, wherein a SPELLERIZED STEEL BOILER TUBE is inserted in a section of tube sheet, in which a hole is drilled exactly similar to the flue sheet of a boiler.

The tube is then forced into the plate with a Prosser expander, flanged and beaded over.



The idea of this test is to approximate conditions of actual service. If the boiler tube does not "stand up" under this severe treatment, it is summarily rejected.

The SPELLERIZED STEEL BOILER TUBE is subjected to many tests before being sent out. In previous announcements we have described the Crop End Test, the Inspection Test (interior and exterior), the Hydraulic Test, the Flange Test, the Pin Test and the Crushing Test.

National Tube Company

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*This is the sixth of a series of announcements in reference to the qualities of and tests given to SPELLERIZED STEEL BOILER TUBES

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United States Steel Products Company, New York, Export Representatives.

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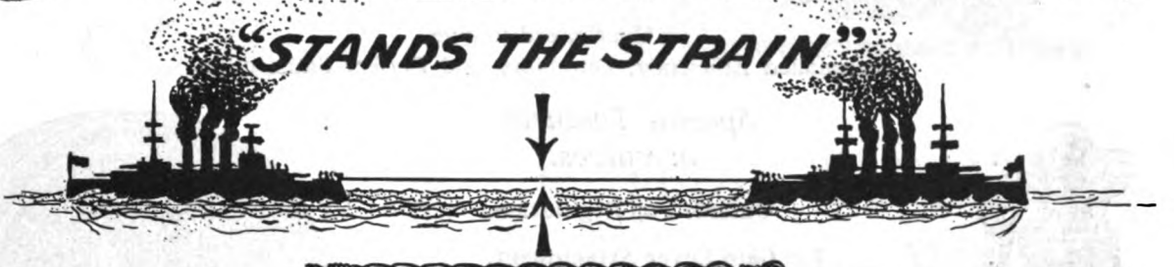

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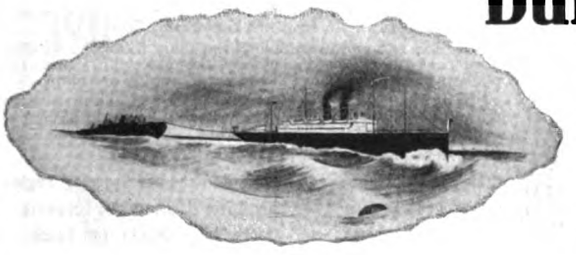

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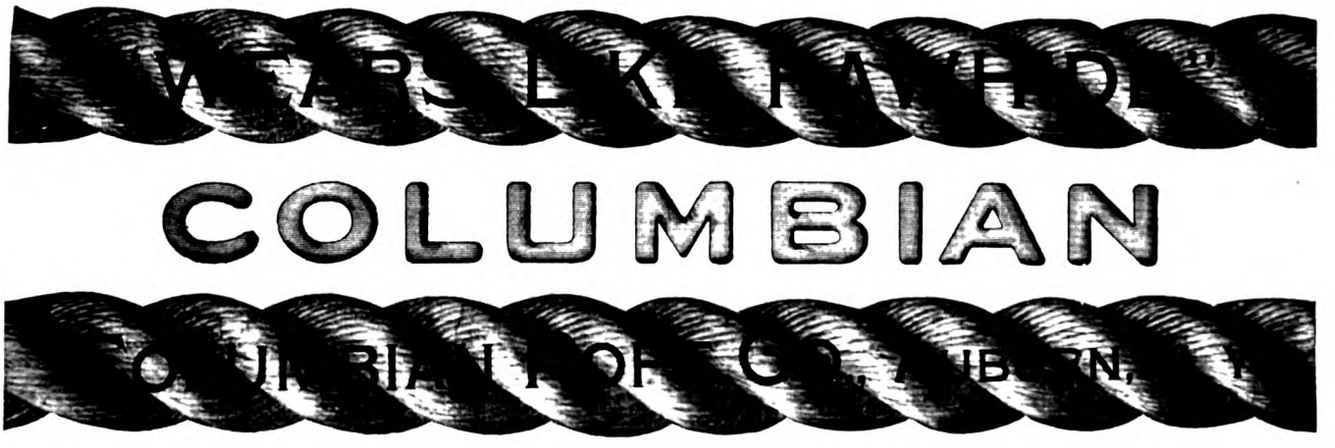

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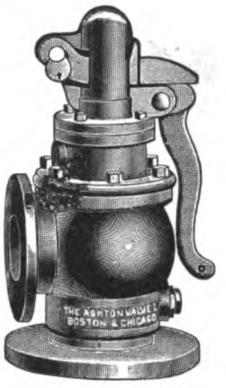

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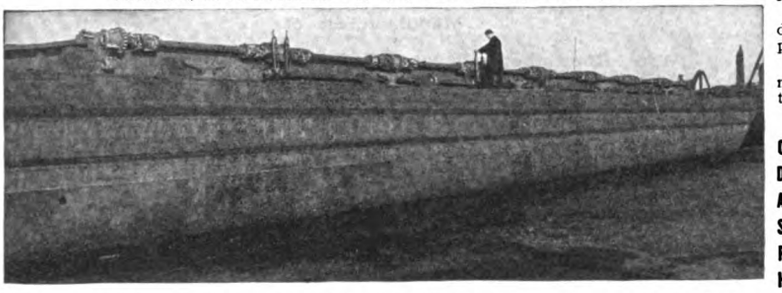

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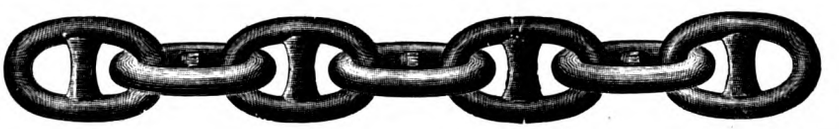

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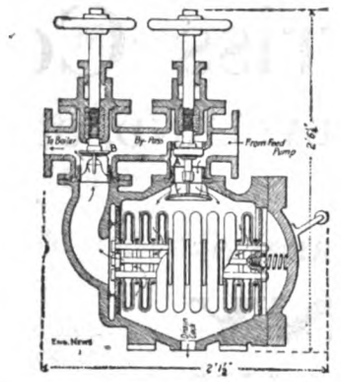

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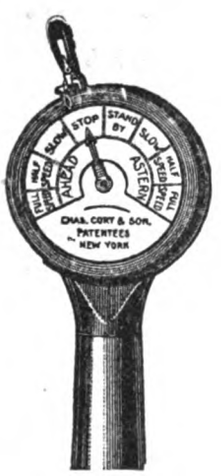

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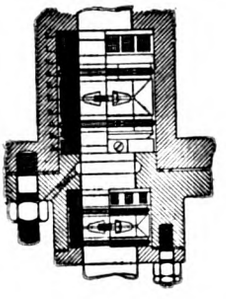

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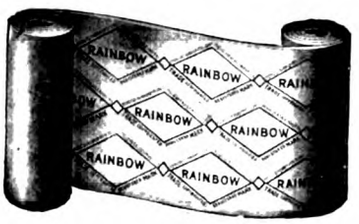

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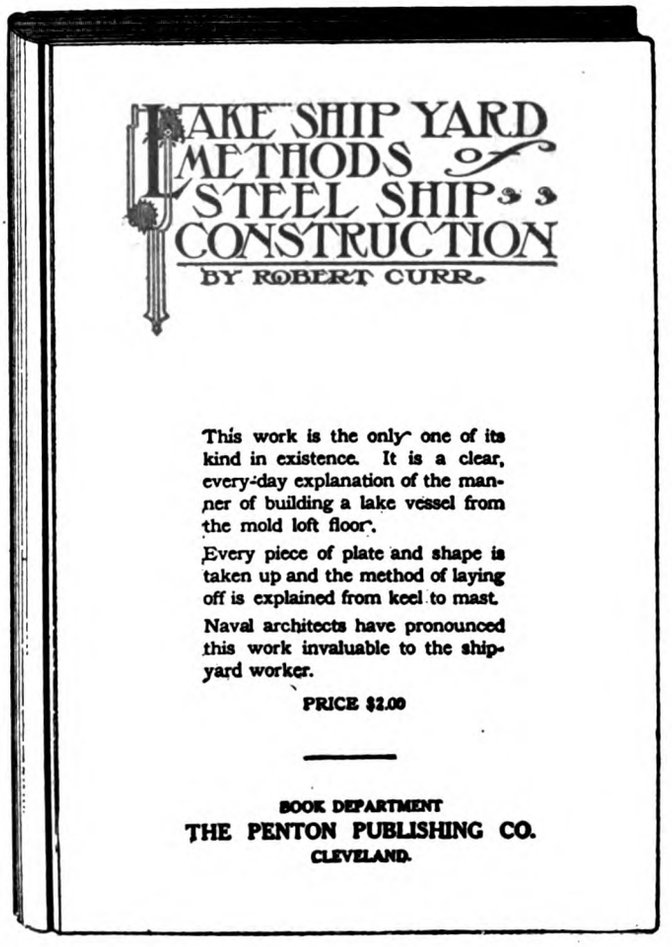

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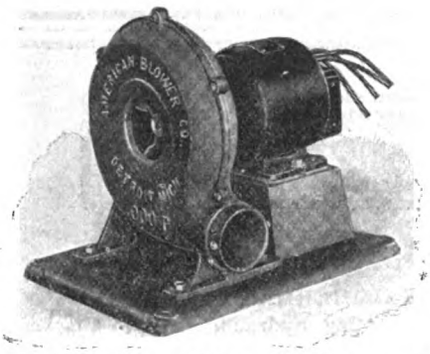

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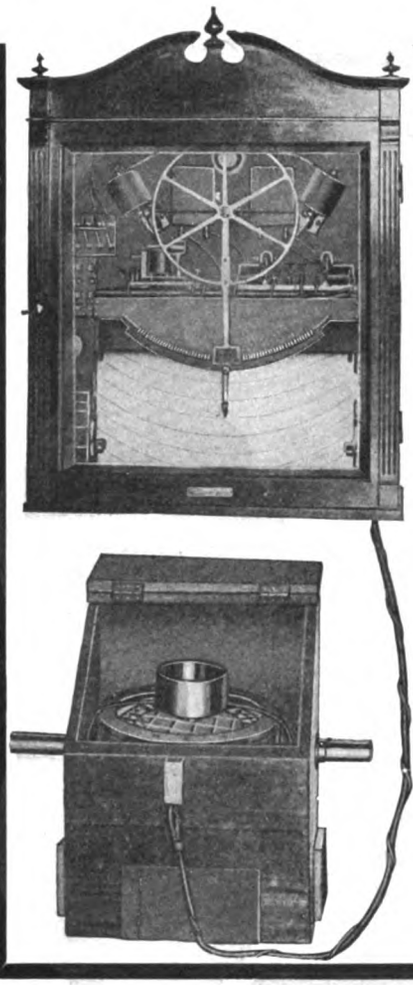

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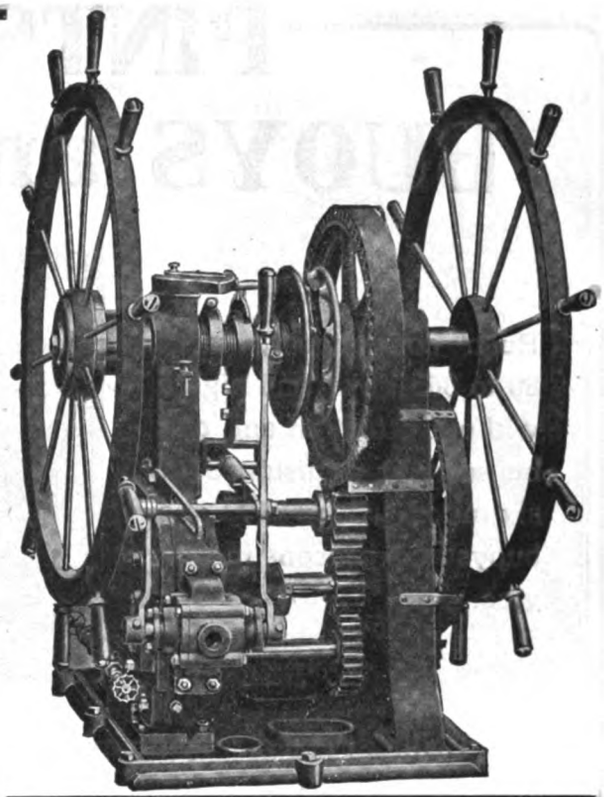

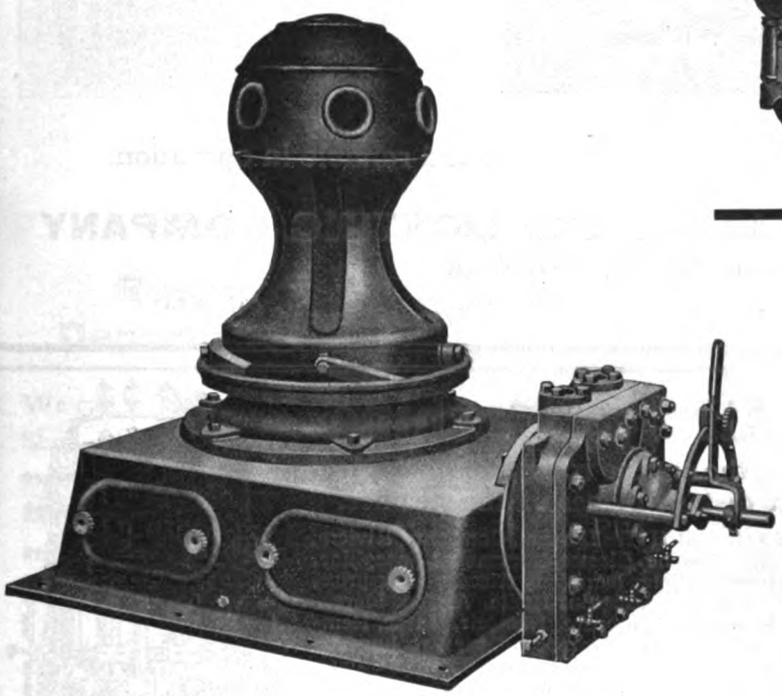

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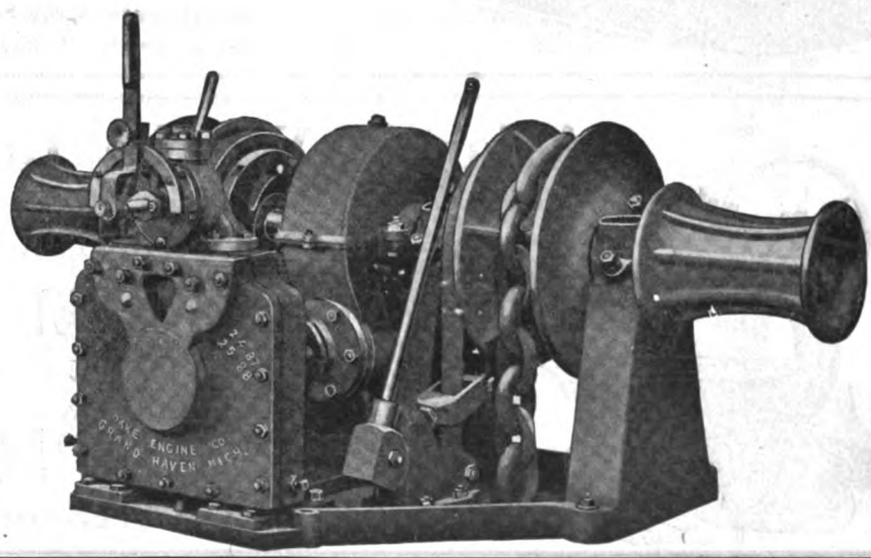

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Grand Haven, Michigan

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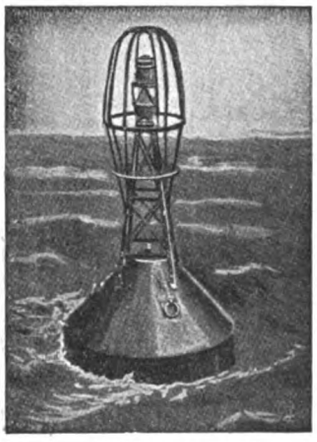

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CHICAGO PHILADELPHIA BOSTON ST. LOUIS MONTREAL BERKELEY, CAL. ATLANTA

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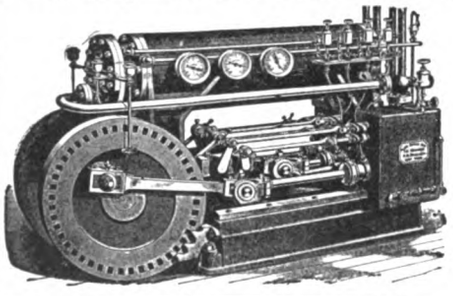
contains no chemicals. It is placed in the engine room, while the ice-making box and meat rooms are at distant places of the steamer.



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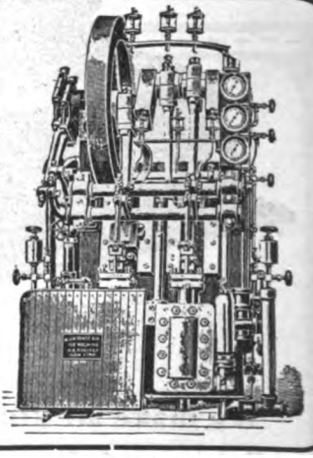

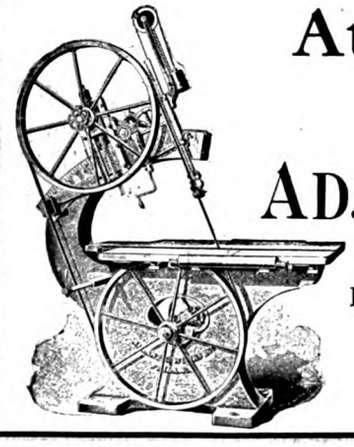

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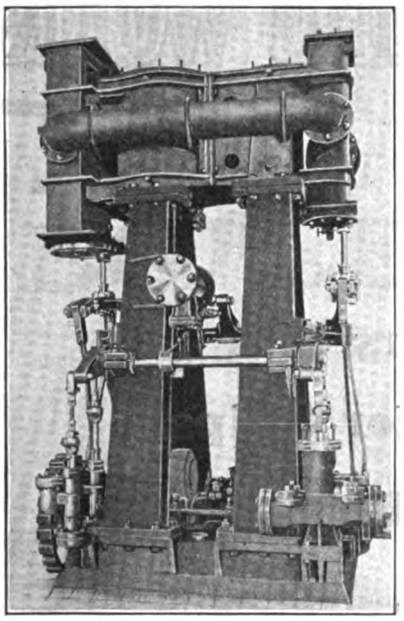

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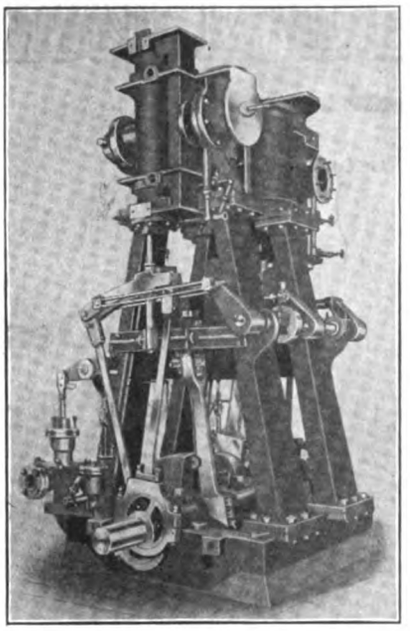

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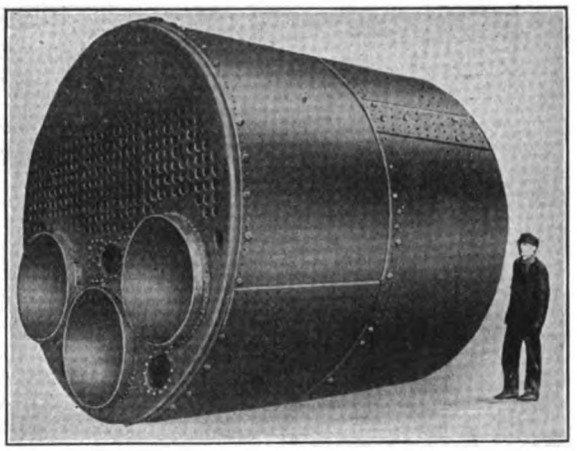

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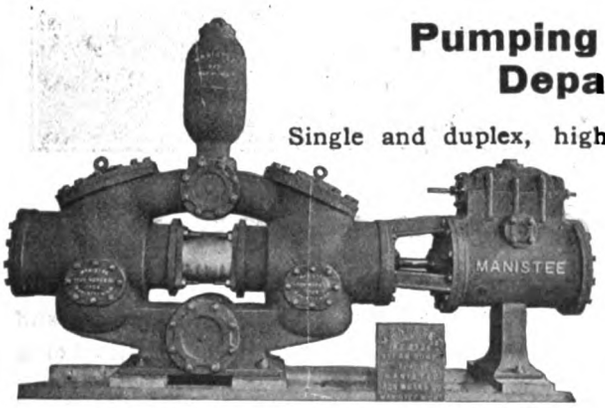

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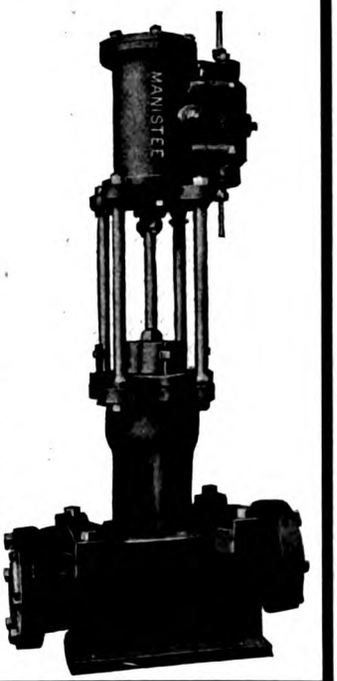

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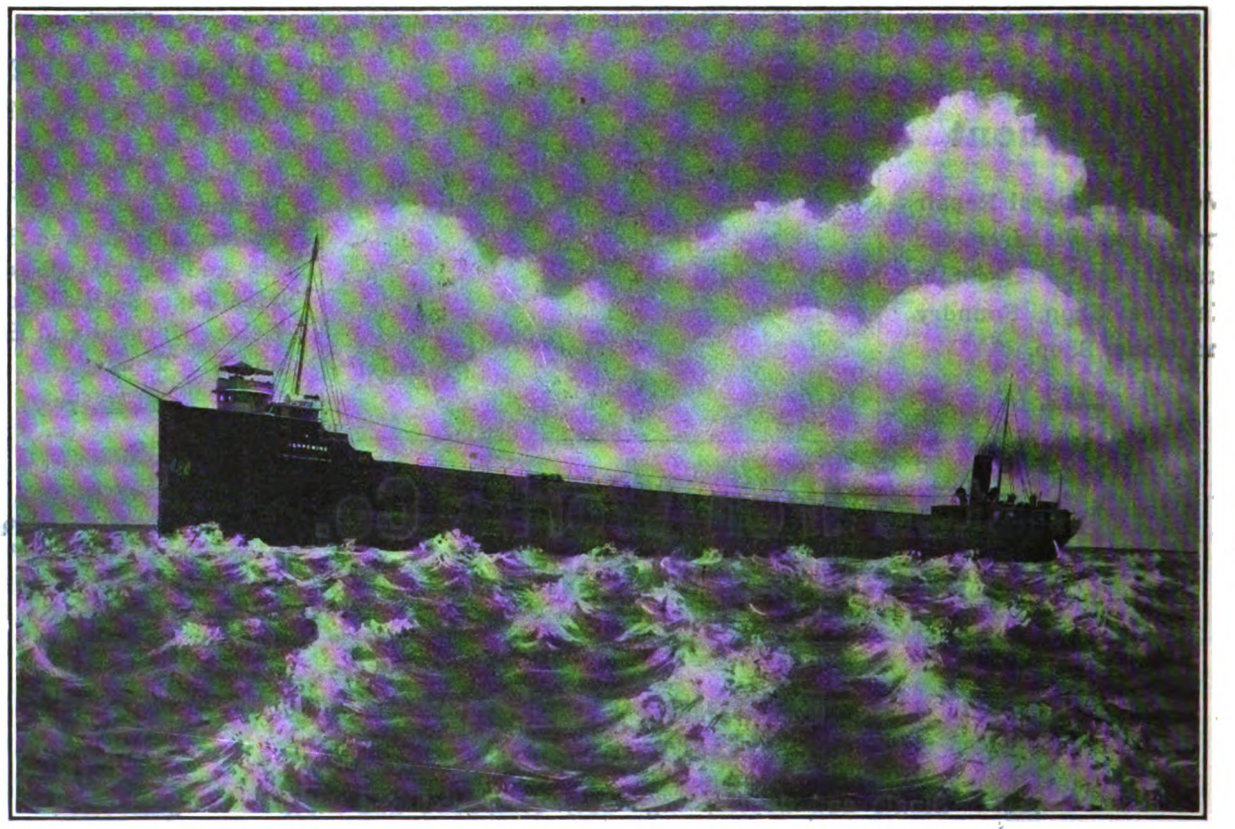

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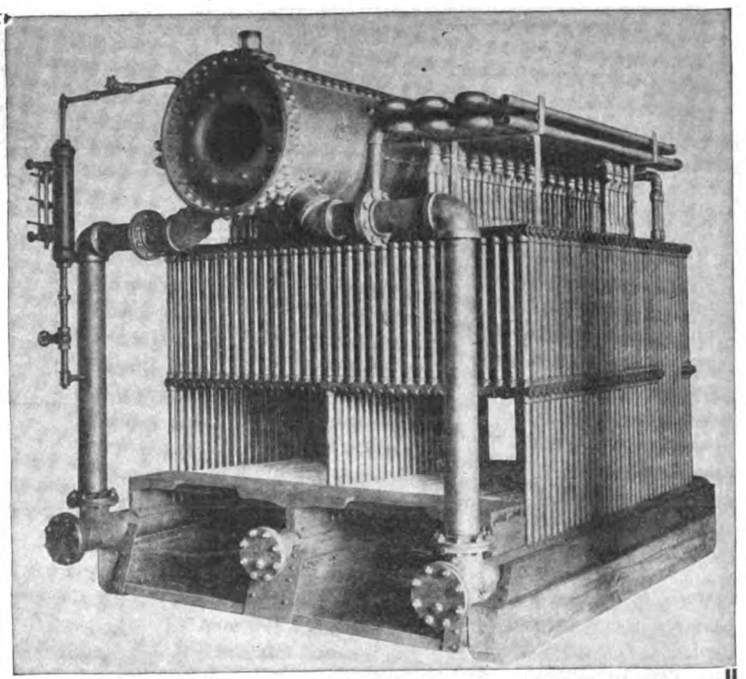

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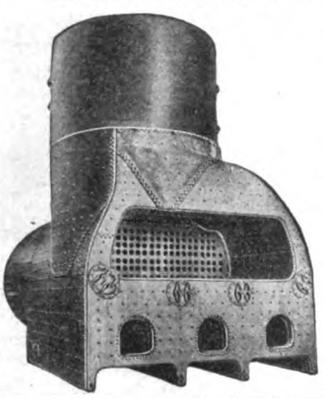

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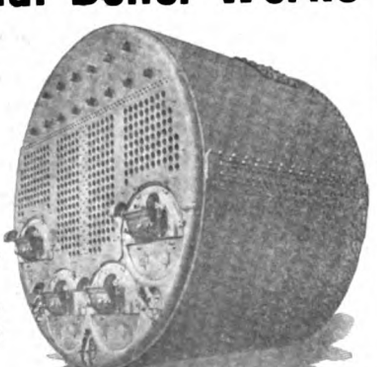

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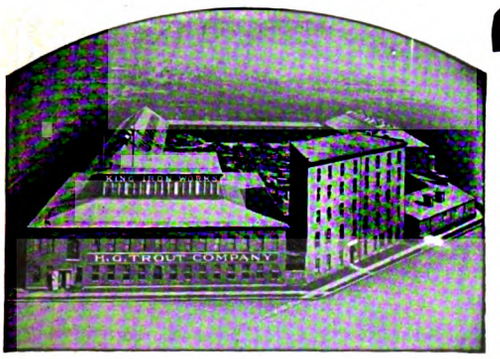

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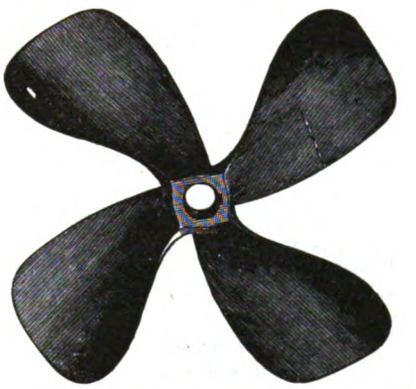

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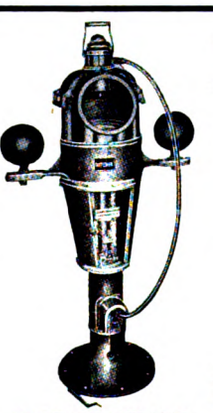

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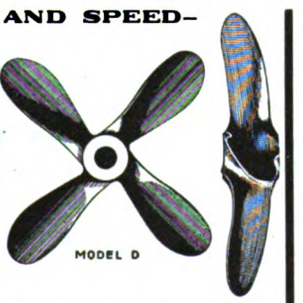

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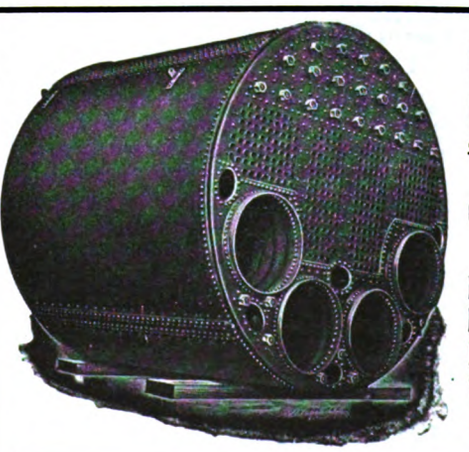

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OF ALL TYPES

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Dake Engine Co., Grand Haven, Mich.
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Hoyt, Dustin, Kelley, McKeehan & Andrews, Cleveland, O.
Hyner, P. D., Erie, Pa.
Kremer, C. E., Chicago, Ill.
Shaw, Warren, Cady & Oakes, Detroit, Mich.

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(Adjustable Bevel.)

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National Tube Co., Pittsburg, Pa.

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Drein, Thos., & Son, Wilmington, Del.

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Ballin Water Tube Boiler Co., Portland, Ore.
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Fore River Ship Building Co., Quincy, Mass.
Gillett & Eaton, Lake City, Minn.
Great Lakes Engineering Wks., Detroit, Mich.
Johnston Brothers, Ferrysburg, Mich.
Kingsford Foundry & Machine Works, Oswego, N. Y.
Manistee Iron Works Co., Manistee, Mich.
Manitowoc Boiler Works, Manitowoc, Wis.
Marine Boiler Works Co., Toledo, O.
Maryland Steel Co., Sparrow's Point, Md.
Milwaukee Ship Building & Dry Dock Co., Milwaukee, Wis.
Moran Co., Seattle, Wash.
New York Ship Building Co., Camden, N. J.
Roberts Safety Water Tube Boiler Co., New York, N. Y.
Superior Ship Building Co., Superior Wis.
Taylor Water Tube Boiler Co., Detroit, Mich.
Toledo Ship Building Co., Toledo, O.
Ward, Chas., Engineering Works, Charleston, W. Va.

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(Marine.)

Bath Iron Works, Bath, Me.

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BUOYS.

(Spar.)

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(Adjustable.)

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Durable Wire Rope Co., Boston, Mass.
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Upson-Walton Co., Cleveland, O.

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Bunker, E. A., New York, N. Y.
Upson-Walton Co., Cleveland, O.

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Chase Machine Co., Cleveland, O.
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Gillett & Eaton, Lake City, Minn.

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(Brass and Bronze.)

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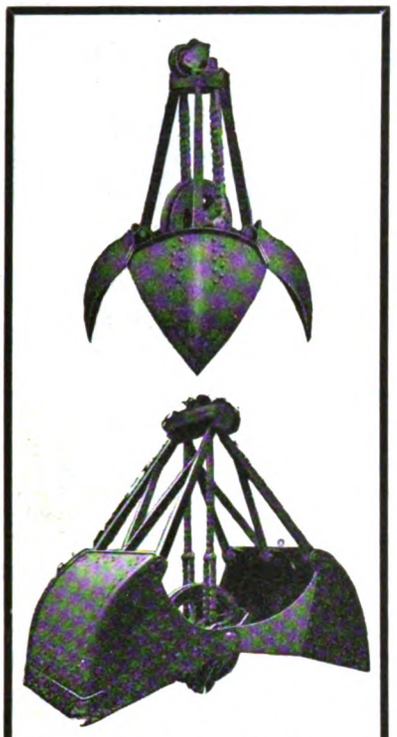

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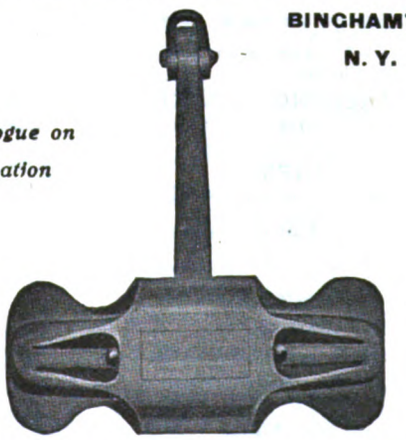

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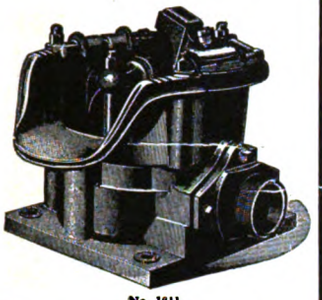

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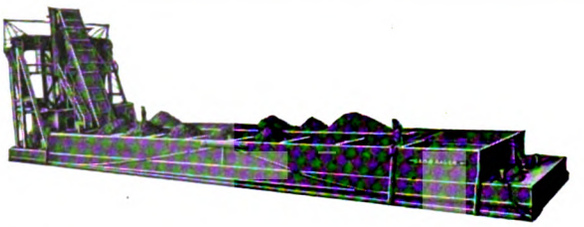

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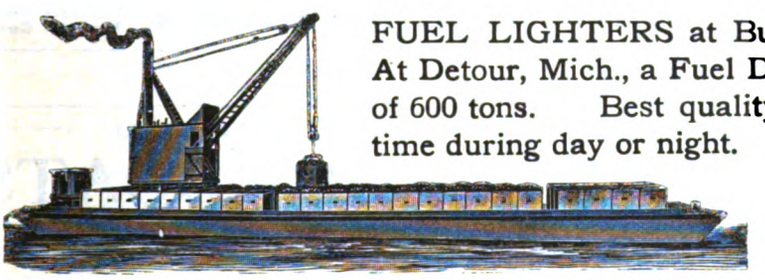

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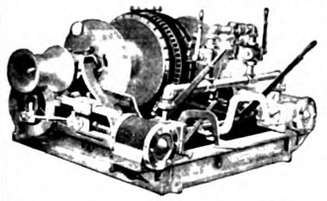

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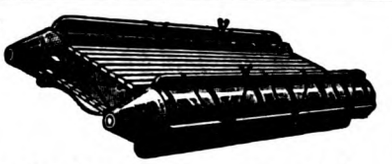

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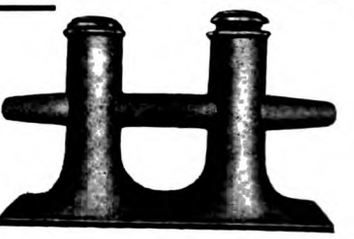

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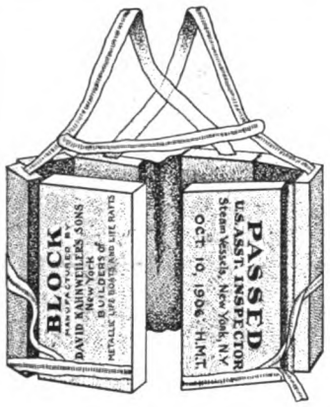

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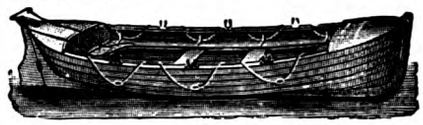

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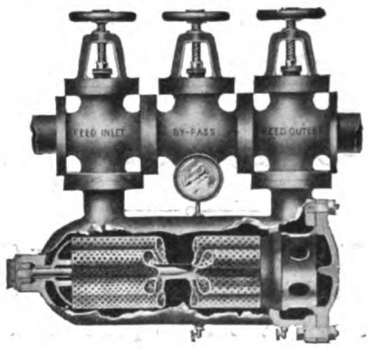

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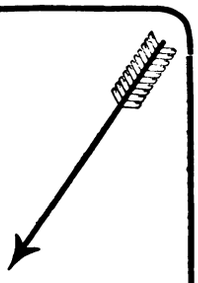

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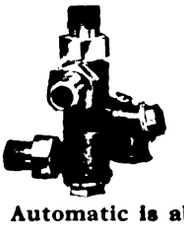

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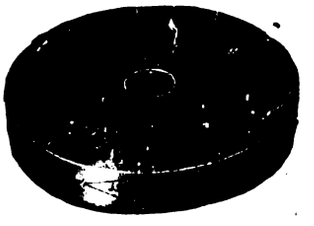

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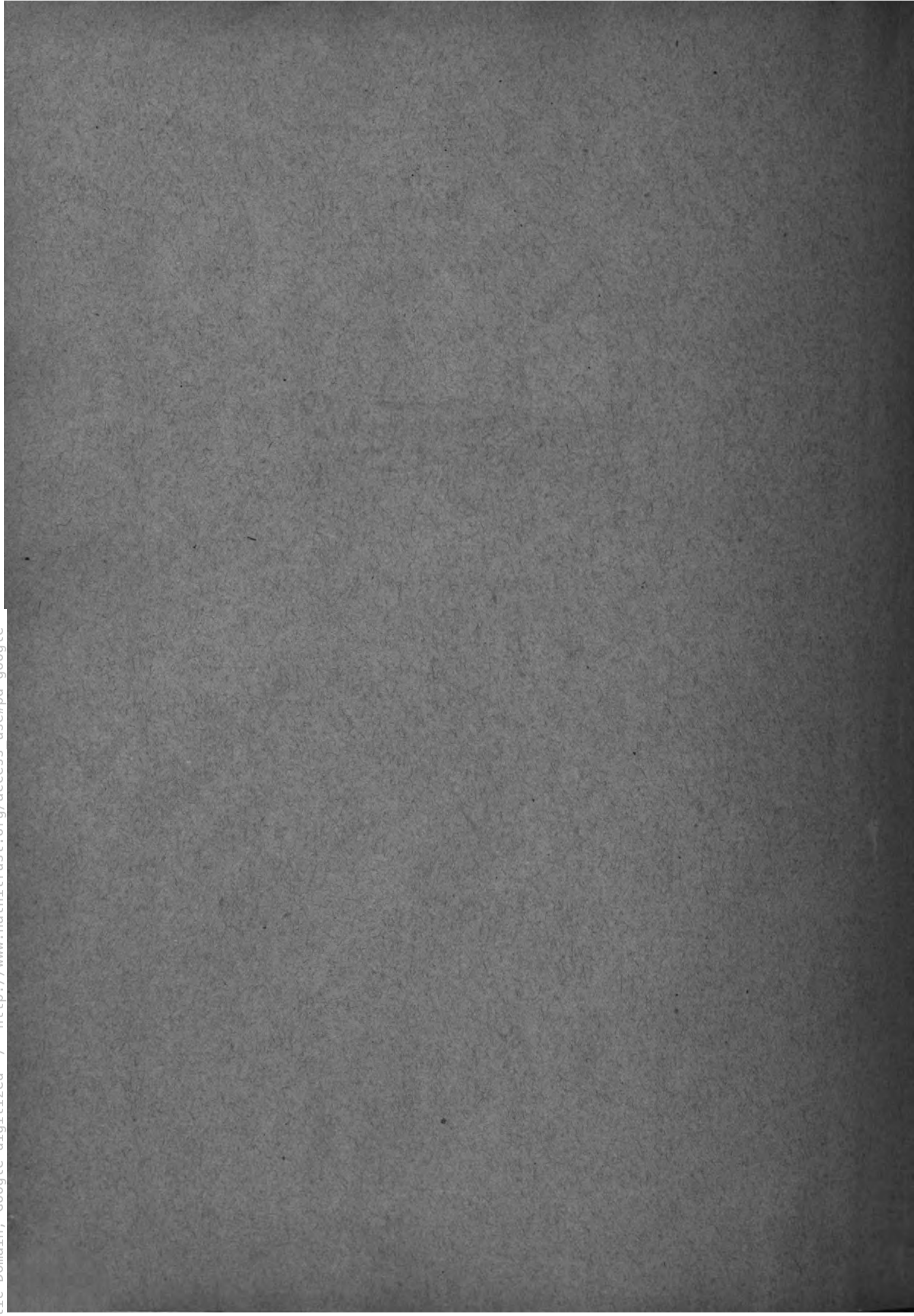

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